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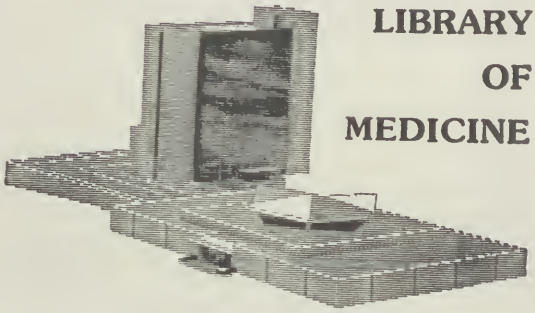

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MEDICAL DEPARTMENT
UNITED STATES ARMY
IN WORLD WAR II

Major General Silas B. Hays
The Surgeon General
1955–1959

MEDICAL DEPARTMENT, UNITED STATES ARMY

MEDICAL SUPPLY IN WORLD WAR II

Prepared and published under the direction of
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MEDICAL DEPARTMENT, UNITED STATES ARMY

The volumes comprising the official history of the Medical Department of the U.S. Army in World War II are prepared by The Historical Unit, U.S. Army Medical Service, and published under the direction of The Surgeon General, U.S. Army. These volumes are divided into two series: (1) The administrative or operational series; and (2) the professional, or clinical and technical, series. This is one of the volumes published in the former series.

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Foreword

Imagine if you can the entire population of the city of New York suddenly dispersed around the world, dependent upon the U.S. Army for medical attention under every conceivable circumstance, and you will begin to comprehend the magnitude of the medical supply operation in World War II. Then, remember that the medical materiel used to care for these 8 million people was only the end-product. The process began with forecasting requirements for global war, and planning procurement. It included the acquisition of raw materials in the face of unprecedented competition, the construction of factories, and the creation of entire industries. It included transportation from mine or farm or forest to processing plants, from plants to depots, and from depots to the far corners of the earth, wherever American troops were stationed. It included the classification and selection of items and the packaging of these into an incalculable number of hospital assemblies, dispensaries, medical and dental chests, kits, and packets designed for individual use. It entailed the continuous flow in enormous quantities of more than 7,000 standard medical items and many, many more that were not standard: billions of Atabrine tablets, millions of surgical needles, thousands of X-ray machines. It included huge storerooms piled high with hospital beds, vaults filled with narcotics, refrigerators by the tens of thousands filled with antibiotics and vaccines, and planes carrying penicillin and whole blood packed in Dry Ice. The individual items ranged from the simple, inexpensive wooden tongue depressor to the costly and delicate electroencephalograph. In overall terms, more than a billion pounds of medical supplies were purchased between 1 July 1941 and 30 June 1945, at a total cost of a billion dollars. Packed in freight cars, the items purchased over this 5-year span would fill a train 400 miles long.

The following account of the U.S. Army medical supply system as it existed during World War II is neither strictly chronological nor wholly functional, but a combination of both, balanced to show so far as possible how completely interrelated were the various aspects of the system. The account is based on hundreds of documents—reports, correspondence, directives, and statistical records—generated as the war progressed; and on the recollections and personal narratives of scores of individuals who participated in the various supply activities, at home and in the theaters of operations. If passage of time has dimmed and softened memories, it has also brought a sense of perspective, expressed in a more considered view of the triumphs and the failures than would have been possible immediately after the events had taken place.

With all due allowance for the inadequacies of documents hastily prepared in the midst of combat, for memories modified by time, and for the understandable bias of each Medical Supply Officer in favor of his own operation, it is an impressive and inspiring story. The unstinting labors, unending sacrifices, and limitless devotion of medical supply personnel around the world provided the means of treating and caring for some 14 million hospital patients

and of dispensary cases beyond the counting. However fine the doctor or skilled the surgeon, both were helpless without the drugs and instruments flowing uninterruptedly through the smoothly organized channels of medical supply.

Leonard D. Heaton,
Lieutenant General,
The Surgeon General.

Preface

This important volume in the administrative history of the U.S. Army Medical Department in World War II has itself had a long, and somewhat checkered, history. The work was begun a decade ago under the aegis of an Advisory Editorial Board, whose members are listed on the flyleaf of this book. Key figures, both in stimulating and in organizing the study, were Col. Charles F. Shook, MC, who chaired the Board, Maj. Gen. Silas B. Hays, and Maj. Gen. Paul I. Robinson. These three, all retired Medical Corps officers with wide and distinguished experience in varied aspects of medical supply, comprised a dynamic subcommittee dedicated wholly to the task at hand despite in each instance a full-time and exacting second career. To spearhead the project, they selected Lt. Col. (later Col.) R. L. Parker, MSC, who gave to the project the better part of 5 years before he, too, retired from active service. With the cooperation, and sometimes the collaboration, of the working subcommittee, Colonel Parker prepared the detailed outline of a book. Then, with the sure hand born of intimate knowledge, he selected literally scores of individuals who, in one way or another, had participated in the medical supply operations of World War II, and assigned them topics connected with their own expertise upon which to write or comment. Before his retirement, therefore, Colonel Parker had not only assembled a manuscript from the many contributions of former medical supply personnel, but had made great progress in reshaping and revising the vast amount of material within it to a usable level.

Colonel Parker's retirement and the unfortunate death of General Hays left The Historical Unit with an incomplete manuscript, which had to be put aside because staff replacements were not then available. When it became possible to resume activities, Mr. William D. Shaver, formerly of the Historians Branch, was selected for the assignment. Working under the direction of the undersigned, and using as guidelines valuable suggestions made by the Office of the Chief of Military History, he reorganized the study, integrated the various individual contributions, and revised and rewrote as seemed indicated. The work as it progressed was reviewed by General Robinson and Colonel Shook, the two surviving members of the working group. Colonel Shook, regrettably, did not live to see the book in print, but read and commented upon the entire manuscript. In its present form, it carries the final approval of both men.

If any one individual could be singled out as author, it would have to be Mr. Shaver, but the contributions of so many others have been so important that it would be unfair to give preeminent credit to any one of them. The entire list of contributors and reviewers appears under Acknowledgments. Very special thanks are due, however, to Colonel Shook, General Hays, and General Robinson, as well as Colonel Parker. Others who labored long and diligently to make the book a success are Mrs. Claire M. Sorrell of the General Reference and Research Branch, Mrs. Martha R. Stephens of the Editorial Branch who did the editing, Mrs. Marjorie G. Shears the index, and on the maps Miss

Elizabeth P. Mason and Miss Jean A. Saffran, of the Special Projects Branch. Thanks are also due to Dr. Stetson Conn, Chief Historian, Office of the Chief of Military History; and to Col. John Boyd Coates, Jr., MC, former Director of The Historical Unit, USAMEDS, who set the whole project in motion.

CHARLES M. WILTSE.

Acknowledgments

The distinction between "Contributor" and "Reviewer" is sometimes tenuous, but, generally defined, a contributor actually wrote a draft manuscript which might vary from a few pages to one or more chapters, while a reviewer read and commented upon one or more of these drafts. It sometimes happened that the same man who contributed to one part of the book also reviewed another part, so that a few names occur in both categories. It should be pointed out, however, that the majority of the contributors devoted long hours and much time to the preparation of their contributory manuscripts and, thus, if any distinction were to be made, it must be in their favor. All names are listed here in alphabetical order, with grateful thanks to each and every one.

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CHAPTER I

The Medical Supply System

MEDICAL SUPPLY BETWEEN WARS

The disruption of the national economy and the delay in delivery of military supplies which developed during World War I convinced Congress of the wisdom of industrial preparedness. The National Defense Act of 1920 charged the Assistant Secretary of War with the "supervision of the procurement of all military supplies and other business of the War Department pertaining thereto and *the assurance of adequate provision for the mobilization of materiel and industrial organizations essential to war-time needs.*" The italicized phrase conveyed authority for the far-reaching procurement planning program which began in 1920 and continued until our entrance into World War II.

Organization for Procurement Planning

The administrative organization for the accomplishment and supervision of Medical Department procurement planning was established on three levels: the Office of the Assistant Secretary of War, the Surgeon General's Office, and the depots of the Medical Department. The overall responsibility of the Secretary was delegated to a Procurement Division established in the War Department late in 1921. On the second level, a procurement planning section was set up in the Finance and Supply Division of the Surgeon General's Office, in June 1922. Designated variously as 'section,' and 'subdivision,' this element of the Finance and Supply Division was charged with "the collection of information and compilation of data pertaining to sources of [medical] supply." It began its work with only one full-time officer.[1]

The field organization for procurement planning was determined by the location of Medical Department depots and was affected to a lesser extent by the establishment in 1923 of 14 War Department Procurement Districts. These 14 districts were combined into 4, with headquarters at New York, N.Y., Chicago, Ill., St. Louis, Mo., and San Francisco, Calif. The choice of cities was determined largely by the location of depots handling medical supplies and by the distribution of the industries concerned. Reorganization of War Depart-

[1] (1) Memorandum Orders No. 1, Office of the Assistant Secretary of War, 25 Oct. 1921, subject: Procurement Division, Office of the Assistant Secretary of War. (2) Annual Report of The Surgeon General, U.S. Army, 1922. Washington: U.S. Government Printing Office, 1922. Series cited hereafter as Reports of TSG, with appropriate dates. Monthly progress reports on Procurement Planning were submitted to the Assistant Secretary of War, beginning in 1924. In April 1925 quarterly reports were substituted, and in 1931 these were replaced by annual reports.

ment procurement activities in 1933 had little or no effect upon the procurement planning activities of the Medical Department. Although an additional center was established at Birmingham, Ala., it remained comparatively inactive and was abolished in 1939. For all practical purposes, procurement planning activities of the Medical Department were confined throughout this period to the four cities designated in 1923.[2]

Personnel engaged in procurement planning in the field also handled current procurement. In St. Louis and San Francisco, the procurement officers of the depots were assigned procurement planning as an additional duty. The medical supply officer at the Chicago Quartermaster Depot doubled as the procurement planning officer. Only in the medical section of the New York General Depot, which handled the overwhelming bulk of Medical Department procurement, were personnel assigned exclusively to procurement planning, the number of officers varying from one to six.[3]

Accomplishments in Procurement Planning

If the difficulties, delays, and embarrassments that had hampered Medical Department operations in World War I were to be avoided, it was clearly necessary to determine in advance (1) what supplies and equipment would be required in the event of war, (2) in what quantity, and (3) from what manufacturing facilities they could be obtained. The preparation of specifications and tables of equipment, and the computation of requirements, were carried out in Washington, D.C.; the location and survey of facilities, and the preparation of production schedules, were the responsibility of the field offices.

The determination of requirements involved, first of all, the preparation of specifications for medical supplies and equipment. The usefulness and military serviceability of the items to be procured were given primary consideration, but experience in World War I had made it apparent that exclusive attention to these aspects would hamper the procurement effort. To describe characteristics which would be ideal might easily result in specifying an item which could not be manufactured in sufficient quantities. "The best is the enemy of the good" applies with special force to wartime procurement. It was the policy of The Surgeon General, therefore, to bear constantly in mind the desirability of making Medical Department specifications conform to the best commercial practices in size, quality, and packaging. Close contact was maintained with national trade associations and the Federal Specifications Board, as well as with the Bureau of Medicine and Surgery of the Navy Department.[4]

In 1928, a total of 3,712 items in the supply catalog required specifications. By the end of that year, specifications for 1,213 of these items had been prepared and had received the approval of the War Department. This number

[2] (1) Memorandum, The Adjutant General to The Surgeon General, 9 Mar. 1933, subject: War Department Procurement Zones. (2) The Story of Medical Department Procurement Planning, 1920–1940. [Official record.] (3) Annual Report of Procurement Planning, Medical Department, 1 July 1934.

[3] Reports of TSG, 1923–39.

[4] Reports of TSG, 1925–27.

was increased to 1,494 by 1932. In 1933, however, a new policy was adopted, which slowed down the process of preparing specifications, but which injected a large element of realism into those which were approved. All specifications prepared during 1933 and subsequent years were subjected to the test of purchasing before they could be approved as official U.S. Army specifications. Until such approval was received, they were described as "Medical Department tentative specifications." By 1937, the test of purchasing had been applied to such an extent that 1,062 items of medical supply were covered by Army specifications. This number was increased to 1,137 in 1938 and to 1,570 in 1939. The Medical Department Supply Catalog in the latter year listed a total of 4,652 items, 3,018 of which comprised the component parts of individual equipment, organizational equipment, and equipment of field hospitals, known collectively as "war items."

Estimating requirements.—In the meantime, the procurement planning section of the Finance and Supply Division had been steadily engaged in determining the quantities of medical supplies which would be needed in the event of war. Of all the tasks connected with procurement planning, none was more tedious, complicated, and uncertain in its accomplishment than the computation of requirements. Although not primarily guesswork, as the critics of procurement planning occasionally charged, the process did involve considerable prophecy, which was almost as hazardous. Requirements figures, moreover, were subject to frequent change and revision to keep abreast of medical and pharmacological advances and to reflect changes in mobilization plans. Within these limitations, requirements figures were a necessary part of procurement planning. Questionable though they might be, they offered the only comparatively stable goal towards which procurement efforts could be directed.

In the computation of requirements, the first important element to be determined was the "troop basis"—the size and composition of the Army which was to be raised if war should come. This information was provided by general mobilization plans prepared by the General Staff and approved by the Secretary of War. In the fall of 1921, the first mobilization plan in the Nation's history was prepared, calling for a total of 1.5 million men. This plan was revised in 1928 and again in 1933, when a considerably larger force was contemplated. In 1938, the Protective Mobilization Plan was approved. This included an "Initial Protective Force" of approximately 400,000 and authorized successive augmentations, if the emergency required it, to an aggregate strength of 4 million men.[5]

Tables of equipment and allowances constituted the next important element entering into the computation of requirements. These tables indicated the types and quantities of medical supplies and equipment to be furnished to each troop unit in the mobilization plan. From 1925, the Surgeon General's Office intermittently prepared and revised tables of equipment and allowances. By

[5] (1) Letter, The Adjutant General to The Surgeon General and others, 13 Oct. 1921, subject: Computation of War Requirements and the Determination of Surplus. (2) Tyng, Lt. Col. F. C., MC, "Speech for Advanced Class, Carlisle Industrial Mobilization," 19 Oct. 1938. [Official record.]

1927, tables had been prepared for the most important types of Medical Department field installations, including general, surgical, convalescent, evacuation, and station hospitals of various sizes; hospital trains, convalescent camps, and Army dispensaries; expansion equipment for field hospitals; and medical regiments, which were then the most important troop units for the evacuation and treatment of battle casualties. In common with other aspects of procurement planning, these tables were subject to frequent change; a thorough revision, begun in 1930, was practically completed by the end of 1931.[6]

Mobilization plans and equipment and allowance tables made possible the computation of initial supplies and equipment which would be needed by various troop units, but they provided little information as to the quantities that would be consumed in training or in battle. Additional information was necessary before maintenance requirements could be computed. To predict the future by an examination of the past, the Procurement Planning Section resorted to the supply and medical statistics of World War I. Maintenance factors thus developed, indicated probable rates of use for each item of supply and equipment, both in the Zone of Interior and in the theaters of operations.[7]

The revised mobilization plan of 1933 made it necessary to recompute all requirements figures, a task completed for the Medical Department late in 1935. By this time also the cubic volume and the weight of nearly half the medical items had been determined, thus providing valuable information for the preparation of shipping schedules. Beginning in 1936, the monthly cost of medical supplies to be procured in the event of war was estimated for each item, and the total cost of each month's requirements for mobilization was computed. The Protective Mobilization Plan of 1938 forced still another sweeping revision of Medical Department requirements figures, a revision which had not been completed when German divisions crossed the frontier into Poland.[8]

Locating manufacturing facilities.—While the Surgeon General's Office was estimating the quantities of medical supplies which would be required in time of war, the procurement planning sections of medical depots were locating and surveying the manufacturing facilities which could produce these supplies. Potential producers were located by various means: contacts with trade and manufacturing associations; references to *Thomas' Register;* and by use of the Bidders' List, which was maintained in the purchasing section of all depots and which contained the names of all manufacturers and dealers who had bidden on Medical Department contracts. When a summary appraisal of a facility indicated its probable usefulness to the Medical Department, the procurement district informed The Surgeon General, who asked the Assistant Secretary of War to allocate the facility to him. This device gave the Medical Department a virtual

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[6] Reports of TSG, 1927 and 1931.

[7] (1) Strong, Maj. E. R., MC, "Procurement Planning II." [Official record.] (2) Speech, Maj. Gen. Robert U. Patterson to Army Industrial College, September 1931.

[8] (1) Reports of TSG, 1931, 1934–36, and 1939. (2) Letter, Col. H. K. Rutherford, Director, Planning Branch, to The Surgeon General, 27 Mar. 1939, subject: Acceleration of Procurement Planning.

monopoly of the military production of the factory affected. By 1928, a total of 1,294 facilities, nearly half of them located in the area extending from Philadelphia, Pa., to Boston, Mass., had been earmarked in this way for the Medical Department. Numerous changes reduced the number of single allocations to 467 by 1937, a number which remained virtually unchanged through 1939.[9]

After a manufacturing plant had been allocated to the Medical Department, it was surveyed to determine its capacity and to evaluate its equipment, its sources of power and raw materials, the adequacy of its transportation, and the number and quality of its employees. The surveys themselves, however, were of widely differing reliability. If the procurement planning officer lacked interest or ability, the survey was hasty and superficial; if the management of a plant cared little for governmental orders or was skeptical of procurement planning, not enough information could be obtained.[10] In too many instances, moreover, restrictions upon travel funds forced reliance upon correspondence instead of on personal inspection.

While the procurement planning officers in the field were making these surveys, medical supply officers in Washington examined the data collected and apportioned Medical Department requirements directly to the allocated facilities. Tentative schedules of production were prepared and presented by the appropriate district procurement planning officer to each manufacturer concerned. The schedule, when approved by the manufacturer, was termed an "accepted schedule of production" [11] and was filed in the Surgeon General's Office. While these schedules obligated neither party, they did serve to inform the manufacturer of the Medical Department's probable needs, and to give The Surgeon General an estimate of a plant's ability to satisfy the needs. It was expected that the schedules would enable procurement officers, upon the outbreak of war, to place contracts promptly for all medical supplies and equipment required in mobilizing a large army.

Between 1923 and 1939, considerable progress was made in the preparation of these schedules. By 1930, a total of 1,713 items had been covered; by the end of 1935, the number had grown to 2,985. In 1938, the task was virtually completed although numerous revisions were expected as changes in Medical Department requirements and the capacity of manufacturing plants became evident. Indeed, the schedules of production, as guides to procurement, could have little value if they were not constantly revised. No manufacturer could be sure of producing a stated quantity of items after the outbreak of war unless he knew that raw materials, tools, and labor would be available, and

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[9] (1) Allocation of Facilities, 1928. [Official record.] (2) Progress Report of Medical Department, Supply Branch, 30 June 1932. (3) Report of TSG, 1937. In addition to the single allocations, there were 6 joint allocations, 54 allocations for the Army and Navy Munitions Board, and 3 for the Office of the Assistant Secretary of War.

[10] (1) Statement of Col. Earle G. G. Standlee, MC, to Lt. (later Capt.) Richard E. Yates, MAC, 9 Jan. 1945. (2) Letter, Capt. Earle G. G. Standlee, MC, to Medical Supply Officer, New York General Depot, 15 Oct. 1936, subject: Survey of Facilities.

[11] Before 1926, the term "war order" was used to describe these schedules. In that year, however, use of the term was discontinued because the schedule was not in fact an "order" in any legitimate sense. It was no more than an estimate of capacity to produce a given item.

naturally, this assurance could not be given far in advance. At best, therefore, the schedules merely indicated quantities which could be produced under favorable conditions; at worst, they represented hasty, ill-considered estimates rendered by a busy factory manager who wished to rid himself of the procurement planning officer and to return to more agreeable tasks.[12]

Throughout these years, procurement planning officers were estimating the quantities of strategic, critical, and essential raw materials that would be needed if the United States went to war. For those materials that were the exclusive procurement responsibility of the Medical Department, specific procurement plans were prepared, including the quantities required, sources of production, and studies of substitutes. Raw materials which were not procured by the Medical Department, but which entered into the manufacture of medical supplies, received less extensive study. Estimates of Medical Department requirements were submitted to the Assistant Secretary of War and then forwarded to the technical service having procurement responsibility, which then consolidated the requirements of all services and prepared specific procurement plans.

Training supply personnel.—A final phase of procurement planning, which engaged the attention of the Medical Department during the two decades preceding World War II, involved the training of Regular Army and Reserve officers for the supply responsibilities of a great war. During World War I, the Medical Department had approximately 400 officers in its supply service, a majority of whom held temporary commissions and promptly returned to civilian life after the conflict ended. When procurement planning began, a determined effort was made to commission in the Sanitary Corps Reserve a number of executives in the industries producing medical supplies. This would have made available to the Medical Department highly skilled men who could, with efficiency and economy, carry on the extensive procurement operations which war would entail.

The prospective Reserve officers proved surprisingly reluctant. They objected to the 15 days of active duty or the enrollment in a correspondence course, required of Reserve officers each year, and they feared the provisions of the penal code which described heavy penalties for agents of corporations who, while employed by the Federal Government, transacted business with their own firms. By 1924, only 62 of these executives had accepted commissions. The number increased to 106 in 1926, and leveled off at 110 in 1927. Increases, if any, during subsequent years are not recorded, but it is probable that the Medical Department considered this element of the Sanitary Corps Reserve to be sufficiently large. The training program for Reserve personnel, although not extensive, was steadily pursued from 1925 until the outbreak of war. Each year from 5 to 16 Reserve officers were called to active duty for 2 weeks. During this time, they served in the Surgeon General's Office, the Office of the Assistant Secretary of War, the New York General Depot, the St. Louis Medical Depot, or other field installations. Whatever their assignment, they were given opportunity to become familiar with Army practices, with the needs of the

[12] (1) Reports of TSG, 1930, 1935, and 1938. (2) See footnote 10 (1), p. 5.

Medical Department, and with the specific procurement plans which had been prepared.[13]

The training of Regular Army officers for procurement and supply duties was far more intensive. In 1922, a Medical Supply Training School was established at the New York General Depot, and six officers were enrolled. The instruction was intended to convey a general familiarity with all supply functions of the Medical Department and with a detailed knowledge of procurement. This school functioned until February 1924, when the establishment of the Army Industrial College in Washington rendered it inadvisable for the Medical Department to maintain a separate school. Supply officers, however, continued to receive an important part of their instruction in the Medical Section of the New York depot.

Operating directly under the Office of the Assistant Secretary of War, the Industrial College instructed supply officers from all technical services in the many-sided problems of industrial mobilization. In addition, each student officer prepared a plan for the procurement of an important item with which his own technical service was concerned, and the plans thus prepared by medical supply officers were incorporated into the plans of the Surgeon General's Office.

The Army Industrial College soon became the capstone of the Medical Department's training program for supply officers. A 2-year tour of duty in the New York General Depot was normally followed by 1 year in the Surgeon General's Office and a 1-year course at the Army Industrial College. During the 1920's from three to five medical officers finished this curriculum each year, and were assigned to procurement planning and supply duties in the Surgeon General's Office or in one of the medical depots in the field. In the 1930's, only 2 medical officers each year were enrolled in the Army Industrial College, but, by the end of that decade, 41 had been graduated. In addition, a number of officers who never attended the Industrial College had received extensive procurement training in Medical Department field installations.

War Reserves and Stockpiles

Shortly after the end of World War I, the Medical Department examined its surplus supplies and made plans to establish an adequate War Reserve. In April 1924, The Surgeon General submitted to The Adjutant General a detailed statement, elaborating the necessity for reserves of medical supplies and listing the types and quantities which should be stored. "The Medical Department," he declared, "becomes upon mobilization, responsible for the immediate provision of adequate hospital facilities and care. There is no training period. Sickness and injury wait for no man." If the necessary supplies and equipment were not readily available, "suffering and loss of life would

[13] (1) Memorandum, Col. Edwin P. Wolfe, MC, to the Assistant Secretary of War, 9 Mar. 1922. (2) Procurement Plan of the Medical Department, 31 Dec. 1922. [Official record.] (3) Reports of TSG, 1924, 1926, and 1927. (4) In 1929, the Medical Department estimated that it would need 95 reserve officers for procurement duties in the event of war. "Personnel on Procurement Planning, Fiscal Year 1930." [Official record.]

result and a storm of criticism would be engendered. Not to provide it is to neglect the lessons of the Spanish-American and World War and to reverse the practice of the Medical Department for the last twenty-five years, a policy which has been successfully defended before and approved by Congress." The Surgeon General then listed supplies and equipment which should be stored as unit assemblies for a large number of field hospitals, hospital trains, medical laboratories, medical regiments, and other installations. In addition, he requested authority to hold in reserve considerable quantities of strategic and critical drugs, field dressings, and surgical instruments.[14]

In September 1924, The Surgeon General was authorized to store as war reserves a portion of the assemblies and items which had been requested. Much of the material was assembled from World War I surpluses. Some unit assemblies were sharply reduced in number, and others were eliminated entirely; the strategic and critical drugs were approved without change; all field dressings were struck from the list, except 1 million first aid packets; and the quantities of surgical instruments were greatly reduced. "You are further directed," The Adjutant General concluded, "to initiate a program extending over four years for building up the existing shortages at the rate of $25,000 a year." [15]

The War Reserve thus approved by The Adjutant General was estimated to be sufficient, when shortages were eliminated, to supply two field armies, or 1 million men, for 2 months. The production lagtime of most items far exceeded 2 months, but there were other, more serious deficiences in the War Reserve. The stocks of medical supplies were not in the proper depots, nor were they suitably assembled. The total value of the authorized War Reserve, including the Quartermaster items in the unit assemblies, was slightly over $24 million, but the value of the stocks actually on hand in February 1926 was less than $9 million. Thus, there was a deficiency of some $17 million,[16] and the only authorized provision for filling this large gap was the program to spend $25,000 a year for 4 years. Repeated efforts to obtain additional funds brought no result. In 1933, a new authorized War Reserve provided a smaller quantity of medical supplies and equipment, but 2 years later, The Adjutant General was informed that even the smaller requirements could not be fulfilled. Among the more serious shortages were hospital assemblies, medical kits, and veterinary kits.[17]

In the accumulation of strategic drugs, the Medical Department's efforts attained a larger measure of success when authority was granted in 1925 to establish stockpiles containing 113,000 pounds of opium, 13,000 pounds of nux

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[14] Letter, Maj. Gen. M. W. Ireland to The Adjutant General, 18 Apr. 1924. This letter was examined by Capt. Richard E. Yates, MAC, in the preparation of the original draft of the Zone of Interior portion of this volume, but has since been lost or destroyed.

[15] (1) Letter, Maj. Gen. H. H. Tibbetts to The Surgeon General, 6 Sept. 1924. (2) See footnote 14, above.

[16] Includes a surplus of approximately $2 million in two units.

[17] (1) See footnote 7 (1), p. 4. (2) Letter, Col. Edwin P. Wolfe, MC, to The Adjutant General, 21 Dec. 1925, subject: Status of War Reserve, and 1st indorsement thereto. (3) War Reserves—Prepared in Response to Letter of February 11, 1926. [Official record.] (4) Letter, Lt. Col. T. J. Flynn, MC, to The Adjutant General, 4 Nov. 1935, subject: Revision of Status Reports Required by AG 381.4.

vomica, and a quantity of cocaine sufficient for 2 years. This program entailed very little expense for the supplies of opium and cocaine, seized by the Federal Narcotics Control Board, were transferred to the Medical Department without cost. By the end of 1938, the stockpile of opium had been increased to 192,000 pounds, and 133,200 pounds of quinine were in the reserve. Largely at the instigation of the Medical Department, additional supplies of both drugs were procured over the next 3 years.[18]

TRANSITION TO WAR, 1939–42

From the outbreak of the war in Europe in September 1939 until the attack on Pearl Harbor, the United States gradually called into being a portion of its great potential military strength and prepared to enter the conflict if necessity should so dictate. This period of more than 2 years was marked by a succession of important developments abroad, each of which served as a warning to the United States and influenced Congress and the President to increase the pace of military preparations. From the standpoint of the supply officer, this 2-year period was a difficult one. It was neither peace nor war, but a frustrating mixture of both. The hypothetical "M-day" on which procurement plans were to be invoked never came. Mobilization took place piecemeal, but was nevertheless far advanced by the time Japanese bombs struck Pearl Harbor.

Organizational Changes

Until a major reorganization in the summer of 1942, the supply functions of the Surgeon General's Office continued to be performed within the Finance and Supply Division, of which Lt. Col. (later Col.) Francis C. Tyng, MC (fig. 1), became chief in May 1939. Neither was there any significant change in responsibilities during this period, except for the elimination of the Procurement Planning subdivision late in 1941 and the transfer of the planning activity to current procurement. The period was marked primarily by expansion to keep pace with the needs of the expanding Army. The 7 officers and 27 civilians who made up the Finance and Supply Division in September 1939 had grown to 16 officers and 201 civilians by December 1941. The depot system by the latter date had 125 military and 2,700 civilian employees.

To administer the growing medical supply organization, experienced men were brought in from civilian life, and Regular Army officers were given special training. A few days before the German invasion of Poland, a number of individuals "especially suited to industrial preparedness" were commissioned and assigned to the Finance and Supply Division. Plans were made for their training in the offices of the Assistant Secretary of War and The Surgeon Gen-

[18] (1) Memorandum, Lt. Col. R. D. Harden, MC, to Col. E. E. MacMorland, Ord C, Office of the Assistant Secretary of War, 21 Nov. 1938. (2) Civilian Production Administration, *Industrial Mobilization for War*, vol. I, p. 75. (3) Study SR–428–326, "Stockpiles of Strategic and Critical Materials. Part I. Opium: Probable Source and Cost of a Postwar Stockpile," August 1944. Foreign Economic Administration, Office of Economic Programs, Supply and Resources.

FIGURE 1.—Col. Francis C. Tyng, MC, Chief, Finance and Supply Division, 1939–43.

eral and in Medical Department field installations. The Army Industrial College continued to train a number of Medical Corps officers. Three Regular Army officers were graduated in 1940. In 1941, 4 Regular Army officers and 8 Reserve officers finished the course, bringing to 56 the number of medical officers who received training at the Army Industrial College during the years 1924–41. In addition, special efforts were made to provide training for Reserve officers who had not relinquished their civilian occupations. In 1940, 23 of these officers took a course of instruction in procurement at the Medical Section, New York General Depot, for which they had been prepared by a correspondence course given a few months earlier.[19]

Planning for Procurement

The supply activities of the Surgeon General's Office during this period were largely of a planning and supervisory nature. The Finance and Supply Division maintained close contacts with the Office of the Assistant Secretary

[19] (1) Memorandum, Lt. Col. R. E. Murrell, MC, to the Executive Officer, OTSG, 31 Aug. 1939, subject: Procurement Planning, SGO. (2) Reports of TSG, 1940. (3) Memorandum, Lt. Col. C. F. Shook, MC, to Col. Charles Hines, Secretary, Army and Navy Munitions Board, 20 Feb. 1940.

FIGURE 2.—Maj. Gen. James C. Magee, The Surgeon General, U.S. Army, 1939–43.

of War, and later, with the Under Secretary of War. As the rearmament program gained speed, these agencies of the War Department observed the procurement progress made by the technical services and enunciated broad policies for their guidance. The Finance and Supply Division received these directives, interpreted them to its field installations, and compiled the many reports required by higher authority. In addition, the division rendered aid to depots, procurement officers, and manufacturers who needed help in obtaining preference ratings, component parts, labor, machine tools, transportation, and other essentials in the fabrication of medical supplies.

Closely connected with procurement planning, and of critical importance in supply preparedness, was the Medical Department War Reserve. Hastily assembled from unbalanced stocks at the conclusion of World War I, the War Reserve was inadequate during the 1920's and 1930's; it was still inadequate, both in quantity and quality, when the United States was precipitated into the war. The reserve was poorly assembled and packed, contained obsolete items, and was not large enough to provide for even modest wartime needs. Maj. Gen. James C. Magee, The Surgeon General (fig. 2), commented bluntly on the matter to the General Staff in May 1940. "Theoretically," he declared, referring to the

unit assemblies of the War Reserve, "there are available 54,750 fixed beds. But it must be clearly understood that the supplies and equipment are of 1918 vintage, incomplete in modern operating room equipment, wholly deficient in essential laboratory equipment, totally lacking in X-ray, physical therapy and hydrotherapy equipment, and stocked with scientific items" already obsolete or rapidly becoming so. This state of affairs had been caused by lack of money, for which, in turn, a general indifference to any kind of military expansion was responsible. "No funds for medical preparedness were allotted the Medical Department since the close of the World War until 1940 when the sum of $295,000 was appropriated and used in the replacement of obsolete items and modernization of *combat* equipment required for the I.P.F. [Initial Protective Force]." In November and December 1939, estimates were submitted to the Budget Officer, War Department, of funds needed to complete the shortages for the Protective Mobilization Plan ($2,696,685) and to provide essential items for an enlarged Regular Army and National Guard ($5,327,000). Both programs, however, were disapproved by higher authority. The Surgeon General then presented a detailed statement of the hospital assemblies urgently required upon mobilization and which, because of delay in procurement, should be built up before the war. "I have not," he concluded, "at the War Department's disposal for any emergency one complete, modern 1,000 bed general hospital for instant dispatch." [20]

A year later, thanks in part to the limited mobilization inspired by Hitler's success in Europe, but more immediately to General Magee's efforts, there were more than 30 properly equipped general hospitals in the War Reserve, together with half as many 750-bed evacuation hospitals and a number of smaller units.[21]

Procurement of Medical Supplies

Although procurement planning and additions to the War Reserve continued during this period, the most important duty of the Finance and Supply Division was the procurement of medical supplies and equipment for an expanding Army and National Guard. On 8 September 1939, the President authorized the Regular Army to increase its strength to 227,000 enlisted men, with a proportionate increase in officer personnel. At the same time, authority was granted to augment the National Guard to 235,000 men. Additional increases in the Regular Army and National Guard were made during 1940, and in the summer of that year, the National Guard was called into the Federal service. On 1 July 1940, the Medical Department was procuring supplies and equipment for a Military Establishment of 800,000 men. The largest peacetime Army in the Nation's history, 1,650,000 men, was gradually mobilized; but,

[20] Letter, Maj. Gen. James C. Magee to The Adjutant General, 10 May 1940, subject: Status of Medical Department for War.

[21] Hearings Before the Subcommittee of the Committee on Appropriations, House of Representatives, 77th Congress, First Session, on the Military Establishment Appropriation Bill for 1942, p. 491 (8 May 1941).

even so, the great increase in Army strength placed severe burdens upon a procurement service which had been geared to a much lower level.

Purchasing officers at the New York General Depot (which procured 90 percent of the medical supplies during this period) and in other depots maintained a Bidders' List including the names of all known manufacturers and dealers capable of filling Medical Department orders. The names of all contractors who had previously filled Medical Department orders were placed on the list; others were added as they were able to convince the Medical Department that they could supply the items needed. Manufacturers or dealers who wished to be included were given lists of standard items purchased by the Medical Department and were notified of future purchases of those items in which they expressed an interest. Prospective bidders were also found in other ways. The Federal Reserve System, for example, undertook to uncover manufacturing sources in its various districts and suggested many names to the Finance and Supply Division in Washington. The Office of Production Management also exerted itself to acquaint manufacturers with the needs of the Army, and, through its Division of Contract Distribution, obtained the names of manufacturers who had idle machinery and were thus able to accept either subcontracts or prime contracts. Prospective subcontractors were referred to prime contractors, and the latter were brought to the attention of the purchasing officers of the Army.[22]

Procurement planning, during the 1920's and 1930's, had been conducted upon the assumption that the technical services would place practically all their contracts with facilities allocated to them. It was hoped by this device to avoid the kind of interservice competition that had delayed procurement and rendered it more costly during World War I. The assumption was quickly abandoned when the rearmament program of 1940–41 got well underway. Neither the President nor the Congress established the economic controls necessary to put the allocations system into effect. The Bidders' List of the Medical Department was not restricted to allocated facilities; it contained the names of all manufacturers and dealers who could furnish medical supplies, regardless of allocation. Of the 253 facilities used, only 172 (or 68 percent) had been allocated to the Medical Deparment.[23]

The system of allocations had not kept pace with the needs of the technical services. New factories had been established, old factories had been converted to war production, and the Medical Department, in common with other technical services, had developed or adopted new items. These changes had not been matched by a thorough revision of the allocations, and thus the allotted facilities were not adequate for War Department needs. Neither were the requirements estimates of the procurement planning days adhered to. Pro-

[22] (1) Letter, Lt. Col. F. C. Tyng, MC, to Mr. H. C. Timberlake, 14 Dec. 1940. (2) Letter, Col. John W. Meehan, MC, to Senator Francis Maloney, 26 Sept. 1941. (3) Letter, Maj. M. E. Griffin, MC, to 12 District Offices of the Defense Contract Service, Office of Production Management, 20 Oct. 1941.

[23] Memorandum, Lt. Col. C. F. Shook, MC, to Lt. Col. F. C. Tyng, MC, 1 Mar. 1941, subject: Report Upon Senate Resolution 71.

curement officers distrusted the requirements figures and considered them to be unrealistic. They had been computed in anticipation of an M-day, when the Nation would spring to arms and a deluge of war orders would issue from the Army. But the slow and steady increase in procurement during 1940–41 did not fit into this pattern. It was very difficult to determine what proportion of the planned requirements should be procured at any particular time.[24] Indeed, when procurement reached floodtide in 1942 and 1943, it was still difficult to tell what part of the anticipated requirements had, in fact, been met.

Instead of relying upon computed requirements figures, the Finance and Supply Division, until 1942, placed its trust in the "depot replenishment system." Each depot submitted to the Surgeon General's Office a stock report showing the receipts and issues of each Medical Department item. Semiannual reports were submitted for nondeteriorating items, while deteriorating items were reported quarterly. These reports, covering approximately 4,500 items, were posted to consolidated stock cards in the Surgeon General's Office; from this information, the probable issues during the next reporting period were calculated. To the probable issues in each item were added the initial supplies and equipment needed to equip new units which were being formed. Thus were obtained the "normal" quantities of each item which should be procured. Although initial equipment could be calculated with fair accuracy, it proved impossible to evolve a satisfactory formula for determining replacement needs. The "normal" quantities of each item were simply increased by an amount deemed sufficient to satisfy needs that were growing at a rapid, but undetermined, rate. It was, in a word, a matter of judgment, but judgment that proved in the sequel to have been generally sound. This "hit and miss" method, as it was described by some supply officers, continued to characterize procurement until July 1942, when the Army Supply Program went into effect.[25]

Estimated procurement requirements were transmitted to the purchasing depots in the form of purchase authorizations. Invitations were then issued to all qualified firms on the Bidders' List, after a lapse of 15 to 60 days, depending upon the urgency of the purchase; the bids were opened, and a contract was made with the lowest bidder. This system had been employed during the unhurried times of peace. It had provided sufficient supplies at the time they were needed and at the lowest possible prices; but it was not adapted to war, nor to hasty preparation for war. Under these conditions, price becomes a secondary factor, and time of delivery and quantity of supplies become prime considerations. This period was marked, therefore, by departures from competitive bidding and by the adoption of negotiated contracts which were designed quickly to obtain from industry the vast quantities of supplies and equipment needed. In July 1940, an act of Congress gave the technical services

[24] (1) Procurement Planning, 1939–41. [Official record.] (2) Letter, Lt. Col. F. C. Tyng, MC, to the Assistant Secretary of War, 28 Nov. 1940, subject: Review of Organization, Procedures and Methods Pertaining to Procurement.

[25] (1) Memorandum, Lt. Col. John J. Pelosi, MC, to Lt. Richard E. Yates, MAC, 7 Dec. 1944. (2) Memorandum, Col. Paul I. Robinson, MC, to Chief, Supply Service, 11 Aug. 1944, subject: Purchasing Policy.

enlarged authority to make open market purchases, and thus to negotiate contracts without competitive bidding.

One of the first steps was to establish liaison with the manufacturers of medical supplies. As early as 1939, The Surgeon General established industry advisory committees on drugs, surgical instruments, and other types of supplies and equipment, and received valuable advice from them on the problems of large-scale procurement. These advisory committees continued to function as advisers to The Surgeon General until September 1940, when they were absorbed by the Army and Navy Munitions Board with a commensurate broadening of responsibilities.

Although purchase authorizations issued in midsummer of 1939 were two and one-half times as large as those issued in the previous summer, it was believed that industry could easily carry the load, except for surgical instruments and a few other items in which trouble had long been expected. For many years, the United States had been largely dependent upon German manufacturers for surgical instruments. This dependence was interrupted by the expansion of domestic manufacturers during World War I; but early in the 1920's, Germany once more captured the U.S. market and held it until the British blockade was established in September 1939. The few surgical instrument factories in the United States were thus presented with an increasing demand, from both military and civilian hospitals, and for export to France, England, and Latin America, which they could not satisfy; nor could production be quickly expanded. Machine tools were difficult to procure; forgings were not available in the large numbers required; and, even more serious, the skilled labor employed in the manufacturing processes could not be quickly trained. The conversion of silver and jewelry manufacturers to the production of surgical instruments offered only limited relief.

It was inevitable that the purchase requirements for the period 1939–41 should be considerably greater than deliveries. This produced a condition of chronic shortages which constituted the most serious problem with which the Finance and Supply Division was faced. In this period of unprecedented expansion, the huge requirements were not fully anticipated and procurement was often initiated too late to produce the supplies when they were needed. The difficulty was further aggravated by the "procurement lag"—the interval of time elapsing between the acceptance of a contract and the delivery of the supplies—which became longer as shortages of labor and raw materials became more acute.

Storage and Distribution

When the Army began its expansion late in 1939, facilities for storage and distribution of medical supplies were geared to serve a small Military Establishment in the quiet days of peace. The main depot of the Medical Department was located in Brooklyn, N.Y. This was the Medical Section of the New York General Depot, which was the distribution point for all overseas garrisons and for all states east of the Mississippi River except Tennessee and Mis-

FIGURE 3.—Building No. 40, St. Louis Medical Depot.

sissippi, which were supplied from St. Louis. The only branch depot belonging exclusively to the Medical Department was the one in St. Louis (fig. 3), which served most of the Midwestern and Rocky Mountain States. The medical sections of the San Antonio, Tex., and San Francisco General Depots were the distributing points respectively for the Southwest and the Pacific coast. Depots for the storage of the War Reserve were located at Columbus, Ohio, New Cumberland, Pa., and Schenectady, N.Y.

Into the active depots of the Medical Department, the supplies and equipment were shipped by manufacturers and dealers, who were informed of the

proper destination by the contract or purchase order. When received at the depot, the supplies were physically inspected to determine if the proper quantity had been received and if they conformed with other terms of the contract. A mere tally-in accomplished the former purpose, but inspections to determine quality, especially of drugs and biologicals, required laboratory examinations. Samples were forwarded to the laboratory of the Medical Section, New York General Depot; and, until results of the examination were received, the shipments being tested were withheld from issue.

Supplies and equipment, after being accepted by the depot, were stored according to item number, and were issued on the basis of requisitions received from the medical supply officers of posts, camps, and stations of the depot's distribution area. These requisitions, normally submitted through Corps Area Headquarters, were of three types. Semiannual requisitions were received on 31 March and 30 September. Quarterly requisitions, generally confined to deteriorating items such as drugs and rubber goods, were due on the first day of January, April, July, and October. Emergency requisitions were submitted as required, but, even these, unless they were based upon dire need, were first cleared through Corps Area Headquarters. A period of 3 months was required to process the semiannual requisitions because they were all received at the same time, and only a limited number of packers were available in the depots. Posts, camps, and stations maintained sufficient stock levels, however, to last until the beginning of the next requisitioning period. The emergency requisitions were filled quickly, sometimes in a single day; and the quarterly requisitions for deteriorating items were also processed promptly.[26]

It will be observed that the storage and distribution functions of the Medical Department, at the beginning of the rearmament program, were conducted on a small, economical scale. Indeed, economy was a most important feature, for appropriations were not generous, and it was necessary to effect all possible savings. The number of civilian employees was kept very low, depot upkeep expenditures were maintained at a minimum, and shipping methods and routes were selected with economy as the foremost criterion. But, as the size of the Army grew during the period 1939–41, and as the procurement of medical supplies markedly increased, it became necessary to expand the depot facilities of the Medical Department. Although the most important part of this expansion occurred in 1941, it began in 1940. By the end of 1940, the Medical Department had a total of 1,203,387 square feet of storage space, of which 575,899 square feet was used for current operations and 537,428 for storage of the unit assemblies in the War Reserve. Aggregate storage space had more than quadrupled by December 1941, when 5,690,028 square feet was so used.[27]

The heavy load which the expanding Army placed upon the Medical Department's storage and distribution facilities brought about other changes in addition to the increase in depot space and operating personnel. Methods

[26] History of the St. Louis Medical Depot, 1936 through 1939. [Official record.]

[27] (1) The Depot Facilities Program of the Medical Department. [Official record.] (2) Memorandum, Maj. D. A. Peters, SnC, to Brig. Gen. Albert G. Love, 23 Nov. 1942.

and procedures which had been adequate for the modest work of the depots during prior years could not cope with the vastly augmented tasks imposed by the rearmament program. Electrical accounting machines were installed, both in the Surgeon General's Office and in the depots, in 1941, although they were not fully mastered for another year. Materials-handling equipment, which so greatly added to the speed and economy of storage operations, also originated before Pearl Harbor. Improvements in the collection and packing of stock, to fill requisitions, were necessary as soon as the workload increased; and by the use of the assembly line system, these tasks were better performed. Inventories were taken more frequently and in a manner which interfered less with current operations.

Helpful though they were, however, these improvements did not fully solve the immense problem of distribution that confronted the Medical Department during 1941. As the Army expanded through voluntary enlistments and the action of Selective Service, training camps multiplied throughout the country; and each camp had its station hospital and its group of regimental dispensaries. In addition, an increasing number of medical troops were being trained for service with tactical units. These installations and troop units needed great quantities of medical supplies, and the medical supply officer of each post looked to his distribution depot to supply the need. In July 1940, there were 110 station and general hospitals, having a total of 22,000 beds. By July 1941, the number of hospitals had grown to 180, and the total beds had increased to 80,000,[28] necessitating shipment of large numbers of hospital assemblies and great quantities of maintenance supplies to posts, camps, and stations. During this early period, stocks were inadequate to supply the large number of hospitals then being constructed. Both the procurement lag and the inadequacy of the War Reserve rendered shortages inevitable. Although the depots made emergency purchases from local sources, many assemblies shipped to the hospitals were only 50 to 60 percent complete. Old 1918 hospital assemblies were torn down and rearranged to meet modern needs, but shortages of medical supplies in the hospitals continued. It is improbable, however, that the scarcity of medical supplies seriously hampered the professional work of doctors and surgeons, who fortunately did not have to cope with any major epidemic.

MEDICAL SUPPLY FOR GLOBAL WAR

Organization of the Medical Supply Service

Supply organization in the Surgeon General's Office.—A sweeping War Department and Army reorganization early in 1942 brought the Medical Department under ASF (Army Service Forces), for a short time called Services of Supply. The reorganization as it affected the Medical Department as a

[28] Magee, J. C.: Activities of the Medical Department in Augmentation of the Army. Army M. Bull. 56: 1–10, April 1941.

whole need not concern us here.[29] So far as medical supply was concerned, the closer relationship with the Service Forces inevitably meant a streamlining of the supply organization in the Surgeon General's Office to conform more closely to the overall pattern. The new organization went into effect on 1 July 1942. The supply functions were separated entirely from fiscal activities, and a new Supply Service was created with five divisions under it: Production Planning, Requirements, Purchases, Distribution, and an International Division. By September 1942, there were 41 officers and 431 civilians on duty in the Supply Service, compared with the 16 officers and 201 civilians who had operated the combined Finance and Supply Division when the United States entered the war. The number had grown to 94 officers and 591 civilian employees by 1 March 1943, when the service was again reorganized.[30]

The March 1943 reorganization divided the Supply Service into two branches concerned respectively with Supply Personnel and Office Management, and seven divisions: Requirements, International, Resources, Procurement, Price Analysis and Renegotiation, Specialties, and Distribution. Among the new organizational units, the Resources Division devoted its attention to alleviating the raw material shortage which, during this period, was hampering the production of medical supplies and equipment. The Price Analysis and Renegotiation Division was established to analyze contract prices submitted by manufacturers and to carry out the terms of the renegotiation statutes which had been enacted by Congress in 1942 and 1943. The Specialties Division, which included an Optical Branch, Laundry Branch, and X-ray Service Branch, was not an operating division. Rather, its function was to study the peculiar problems encountered in the procurement and distribution of certain specialized items and to make this information available to the other divisions. It had administrative and coordinating functions almost entirely.

This reorganization had been recommended by Mr. Edward Reynolds, former president of the Columbia Gas and Electric Corp. of New York, and then Special Assistant to The Surgeon General. When Maj. Gen. Norman T. Kirk became The Surgeon General in June 1943, Colonel Tyng, Chief of the Supply Service, was relieved and Mr. Reynolds became Acting Chief. In the spring of 1944, he was commissioned a colonel, Medical Administrative Corps, and was appointed Chief of the Supply Service (fig. 4). A further reorganization, meanwhile, had eliminated the separate branches and reduced the seven divisions to five: Supply Planning and Specialties, International, Renegotiation, Procurement, and Distribution and Requirements. Thus were eliminated the Resources and Requirements Divisions, while the functions of the latter were merged with those of distribution. This trend toward simplification was carried a step further in September 1943, when the Supply Planning and Specialties Division was abolished; but in November 1943, it was

[29] For more detailed treatment, see (1) Medical Department, United States Army, Organization and Administration in World War II. Washington: U.S. Government Printing Office, 1963, pp. 72–93. (2) Millett, John D.: U.S. Army in World War II. The Army Ground Forces. The Organization and Role of the Army Service Forces. Washington: U.S. Government Printing Office, 1954, pp. 36–42.

[30] Memorandum No. 1, Supply Service, OTSG, 1 Mar. 1943, subject: Organization of Supply Service.

FIGURE 4.—Col. Edward Reynolds, MAC, Chief, Supply Service, Surgeon General's Office, 1943–46.

reinstated as the Supply Planning Division with expanded functions. In addition to its administrative and coordinating duties in procurement of optical equipment and supplies, this division had the responsibility of preparing and distributing the Medical Department Supply Catalog and Equipment Lists and with aiding in the development of new items.[31]

This last reorganization, however, was marked by a far more important change and by the beginning of a trend which continued until the end of the war. The Procurement Division was renamed the Purchase Division, and was transferred to the Army Medical Purchasing Office, successor to the New York Procurement District. A liaison branch of the Purchase Division was established in the Supply Service in Washington, which maintained close contacts with the Army Medical Purchasing Office and independently performed certain functions related to procurement. The movement of the Purchase Division to New York reduced the number of officers assigned to the Supply Service from 94 to 75. At the same time, the Reports and Records Branch was set up as a separate unit to compile the many reports required by the staff divisions of Headquarters, ASF, and to keep the Chief of the Supply Service

[31] Memorandum No. 1, Supply Service, OTSG, revisions of 16 June and 29 Nov. 1943.

constantly informed of the progress made in the procurement and distribution program.

The largest and least cohesive part of the Supply Service, at this date, was the Distribution and Requirements Division. Staffed by 33 officers and a substantial civilian group, this division was composed of five branches: Storage, Requirements, Issue, Maintenance, and Inventory Control, the latter being attached to the Army Medical Purchasing Office in New York. When one considers this division's important duties in computation of purchase requirements, control of stock levels, operation of depots, repair of medical equipment, and distribution of medical supplies, it is apparent that its efforts were spread over a large area and included many parts of the entire supply program. The largest task which yet remained for administrative reorganization was to break down this unwieldy division and to assign its duties to separate divisions on a functional basis.

A slight reorganization in March 1944 reduced the number of divisions to four by eliminating the Supply Planning Division; and increased the separate branches to three by the addition of the Materiel Demobilization Unit and the Catalog Branch. These new offices assumed some duties of the abolished Supply Planning Division; the remainder were lodged in the Liaison Branch, Purchase Division. A more thorough reorganization was effected in June 1944, when the Distribution and Requirements Division was abolished. In its place were established the Stock Control Division, Issue Division, and Storage and Maintenance Division. The Renegotiation Division was transferred to the Army Medical Purchasing Office, and a liaison unit of that division was established in Washington. The Inventory Control Branch, a part of the Stock Control Division, remained in New York. At this time, also, the offices of the Deputy Chief for Supply Control and the Deputy Chief for Storage Operations were established as consulting agencies for the Chief, Supply Service, and were staffed by qualified civilians.[32]

As the war neared its end, the movement of Supply Service units to New York continued. In November 1944, the remaining branches of the reorganized and enlarged Stock Control Division were transferred to the Army Medical Purchasing Office. The single exception was the Requirements Branch which retained its Washington location until July 1945. In the meantime, in March 1945, the independent Catalog Branch went to New York. Shortly before the German surrender in May 1945, plans were made to move other parts of the Supply Service to the Army Medical Purchasing Office, but these plans were abandoned when it became apparent that the procurement and distribution programs would soon be sharply curtailed.

Field organization for medical procurement.—When the United States entered the war, the actual purchase of medical supplies and equipment was divided between the Medical Section, New York General Depot, and the St. Louis depot, an arrangement dictated by fear that sabotage or even enemy bombing might knock out the New York facility. The St. Louis depot had pur-

[32] OTSG Manual of Organization and Standard Practices, Organization Chart 3.09, 24 June 1944.

chase responsibility for drugs, chemicals, and stains (class 1); X-ray equipment and supplies (class 6); furniture, physiotherapy equipment, mess equipment and supplies (class 7); veterinary equipment and supplies (class 8); and field equipment and supplies (class 9). The Medical Section of the New York General Depot purchased the remaining medical items, which included surgical dressings, surgical instruments, laboratory equipment, and dental supplies and equipment.

Early in 1942, the New York Medical Depot was established as the successor to the Medical Section, New York General Depot. In August 1942, the New York Medical Depot was moved to Binghamton, N.Y., but its Purchasing and Contracting Section remained in the city to become the nucleus of a newly activated New York Medical Department Procurement District. This purchasing office was divided into four Buying Sections, a Conservation and Production Control Section, and an Operations Section, which was concerned with administrative matters.[33] Each Buying Section (later called Purchasing Branch) procured items in a single commodity group, thus permitting procurement officers to specialize on a particular class of items and to become familiar with the capacities and problems of the producers. As procurement operations expanded, personnel steadily increased. In December 1942, the New York office had 58 officers and 338 civilian employees; by June 1943, the number of officers had increased to 74 and civilian employees to 413.[34]

The St. Louis Medical Department Procurement District, established in August 1942, had an organization similar to that of the New York office. Originally there were three Purchasing Branches: Drugs and Chemicals; X-ray and Physiotherapy Equipment; and Miscellaneous Equipment and Supplies. To obtain greater clerical efficiency, the second and third branches were consolidated in April 1943, the new unit being designated the Hospital Equipment Branch. As the procurement load increased, other departments were established to perform functions involved in production control, inspection, public relations, renegotiation, and office administration. During calendar year 1943, personnel increased rapidly. The number of officers rose from 12 to 63, and the number of civilian employees from 161 to 241.[35]

These two purchasing offices, first as depots and later as procurement districts, contracted for practically all of the medical supplies used by the Army during the war. The St. Louis depot lasted throughout the war, but the procurement district was abolished in September 1943, when it was considered safer and more economical to consolidate all Medical Department procurement in New York as the Army Medical Purchasing Office. In the words of the ASF circular[36] which activated the new unit, the office was "responsible for the actual procurement of medical supplies, including production control,

[33] Annual Report of Activities, New York Medical Department Procurement District, fiscal year 1943.

[34] Annual Report of the Supply Service, OTSG, 1943.

[35] See footnotes 33 and 34, above.

[36] Army Service Forces Circular No. 79, 15 Sept. 1943.

issuance of priorities, survey of facilities, and inspection of supplies." At this time, branches were established in Chicago and St. Louis, the main duties of which were to aid contractors in procuring raw materials, component parts, and labor. At this point, the Purchase Division of the Supply Service was transferred to New York, where it became an integral part of the Army Medical Purchasing Office. Thereafter the Supply Service, for all practical purposes, centered in New York rather than in Washington.

Personnel and training.—By mid-1943, the Medical Supply System, exclusive of the overseas theaters, had expanded its personnel to 800 officers and 15,050 civilians on duty, both in Washington and in the field. Turnover of personnel was caused largely by the constant drain upon the Surgeon General's Office and the depots to fill the personnel requirements of a global supply system. At the same time, however, The Surgeon General was able to draw upon the service of many keymen from civilian industry. Among those most helpful were Mr. Herman C. Hangen of J. C. Penney Co., Mr. Mead M. Messick of Montgomery Ward & Co., Mr. C. W. Harris of Butler Brothers, and Mr. W. A. Hower of Van Raalte Silk Co.

For training medical supply personnel, various courses were provided during the war years, both by ASF and by the Surgeon General's Office. The Medical Supply Officers Orientation Course provided training in military customs, courtesy, procedure, and medical supply for the new officers reporting to the St. Louis Medical Depot for duty in medical supply work. In early 1943, ASF established a three-phase course for training of commissioned depot personnel. This was known as the ASF Depot Course. The first period was conducted at the Quartermaster School, Camp Lee, Va., and covered all operational phases of Army warehousing, organization of the Army for supply, handling and transporting of supplies, property accounting, packaging and crating, and open storage. The second period, conducted at the St. Louis Medical Depot, was identical with the Medical Supply Officers Orientation Course. For the third phase, student officers were assigned to one of the medical supply distribution depots to gain experience in previously studied supply activities.[37]

In June 1943, two courses—Phase II of the ASF Depot Course and the Maintenance Course—which were conducted at the St. Louis Medical Depot, were designated "The Medical Supply Service School." Training of units organized under tables of organization and equipment was added to the Medical Supply Service School curriculum during 1944. This training consisted of functional employment in the St. Louis Medical Depot, orientation as to overall training in the supply field, and field training. Medical Supply Platoons (Aviation) were trained during 1943–44 at Savannah Medical Depot to prepare them for ready use overseas.

[37] Annual Report, Training Division, Operations Service, OTSG, fiscal year 1943.

Role of the American Red Cross

Relationship between ARC (American Red Cross) and the Supply Service increased in scope during the war period. Major ARC activities in the area of supply for the Army were the blood program [38] and the surgical dressing program. The Army, however, furnished or purchased medical supplies required by ARC for various purposes and supported its war relief program logistically.

Blood program.—Plasma units were compact, and possessed long keeping qualities not true of whole blood, which was good for use only up to 21 days after collection (fig. 5). These favorable characteristics of dried plasma permitted ease of use and handling in the combat areas. Through cooperation of Army, Navy, National Research Council, ARC, and commercial biological manufacturers, a blood plasma procurement program calling for the production of a minimum of 700,000 units of dried plasma for the Army was instituted in fiscal year 1942. The Surgeon General considered the plasma program to be of such significance by February 1943 that he appointed Col. Charles F. Shook, MC, as Liaison Officer, OTSG, responsible for contact with ARC, and for furtherance and proper management of this vital program. When Colonel Shook was transferred to the Mediterranean theater as Surgeon, Services of Supply, Maj. Frederic N. Schwartz, MAC, took charge of the program and remained in that capacity until termination of the war.

Until August 1943, plasma was manufactured in units of 250 cc. At that time, the size was changed to 500 cc. because this was the normal amount administered, and this larger unit conserved shipping space and reduced the total amount of critical materials (rubber, steel, and tin) required. The blood plasma program progressed to a grand total of 3,070,806 small units, and 3,115,877 large units by 1945.[39] Although blood banks were established in overseas combat areas, sufficient quantities of whole blood for treatment of casualties could not be obtained, and by August 1944, supplemental shipments from the United States became imperative. The Army Medical Department provided for the needs of the European theater for type "O" blood through the services of ARC via facilities of the Air Transport Command. The Navy used a similar method in providing for needs in the Pacific. After V–E Day, the ARC ceased collecting blood for military services from all except the major cities of the United States. On 10 August 1945, the ARC was advised that the Army would not require blood for processing into dried plasma as soon as V–J Day was announced officially.

Surgical dressing program.—During the expansion period before the entry of the United States into the war, it was discovered that the Army Medical Department had grossly underestimated its need for surgical dressings. Frustrated because industry was too deeply involved in other forms of war production to cooperate, The Surgeon General turned to the Red Cross

[38] For further details, see Medical Department, United States Army. Blood Program in World War II. Washington: U.S. Government Printing Office, 1964, pp. 101–137.

[39] Hornbacher, Arthur: Blood Plasma. [Official record.]

FIGURE 5.—Chest, Plasma, Complete, consisted of Medical Department chest, plain, and 20 units of plasma, normal, human, dried, 250 cc.

for help. The response was overwhelming, resulting in the accumulation of large stockpiles of dressings between 1941 and 1944. The Medical Department reciprocated by furnishing the Red Cross with needed supplies. Several medical assemblies were furnished as well as stocks, such as blood plasma, drugs, dressings, and surgical instruments for prisoners of war on both sides, and supplies for Allied countries.

Following V–E Day, the Army reevaluated its requirements and assets to release, before V–J Day, as much excess material as possible to civilian channels. Basing action on the Surplus Property Act of 1944, items in excess of Army requirements, such as blood derivatives and surgical dressings, were first reported as excess, then obtained in large amounts to be used in civilian

emergencies or for charitable purposes throughout the United States and overseas areas.

Demobilization Planning

Planning for demobilization began in the Surgeon General's Office in August 1943. The early stages of the demobilization program were carried out under several officers progressively: Col. Paul I. Robinson, MC, Col. Stuart G. Smith, MC, Col. William L. Wilson, MC, then back to Colonel Robinson. On 5 February 1944, the Commanding General, ASF, advised the chiefs of Technical Services that materiel demobilization planning was a command responsibility at each echelon in the chain of command. The Surgeon General had already established a unit for this purpose directly under the chief of the Supply Service. By the end of fiscal year 1944, a series of plans for period I (redeployment, readjustment, and demobilization between the defeat of Germany and that of Japan) had been developed which reflected current procedure and policy changes set forth in the ASF Materiel Demobilization Plan. The Surgeon General's plan directed action regarding inauguration of the revised procurement program for period I; determination of contracts to be terminated; methods of receiving, storage, caring for, and disposing of finished and unfinished products; review of research and development projects; revision of spare parts lists; and efficient handling of military lend-lease shipments.

Special studies were made on potential requirements for medical items sought by outside agencies such as the Red Cross, United Nations Relief and Rehabilitation Administration, and Civilian Relief in Liberated Areas. Also, the stockpiling of a peacetime war reserve was essential. Disposal of medical property needed careful handling. To flood the market with surplus Government stocks at the conclusion of the emergency would have adversely affected small business. The plan proposed that certain items be distributed to eligible federal, state, county, and municipal health institutions and sanitary health agencies on a grant basis under a control system to establish the fact that these institutions could not afford to purchase health articles required for their missions.

The objectives of this proposal were to get the maximum number of surplus medical items into worthwhile use and out of Government storage in the shortest possible time; to cause minimal impact on industry; to cause minimal tax burden for accomplishment of important health advances; and to effect improvement in medical care throughout the United States, thus reducing the number of persons physically ineligible for military service.

Many actions of the Materiel Demobilization Plan were placed in effect as operating procedures before V–E Day arrived. Agencies were alerted, and on V–E Day, the remaining actions of the plan were placed in effect. A specific plan was devised to furnish units in the Far East with medical equipment from stocks available in the European theater.

The plan for readjustment and demobilization after V–J Day was prepared by the Supply Service under Col. Jenner G. Jones, MC, and Maj. Richard J. White, Jr., MAC. Specific activities and responsibilities of the Supply Service were outlined as follows:

1. Review procurement objectives for the balance of 1945 and 1946 for all medical items; compute procurement programs to reflect demobilization phasing; determine War Reserve requirements and a peacetime Army Supply Program based on the appropriate troop basis; cancel and reschedule programed procurement to meet period II procurement objectives; terminate all contracts approved for termination and expeditiously settle all such contracts; determine and report quantities which were surplus to the War Reserve and peacetime army requirements for periods II and III.

2. Discontinue security inspections except at privately operated facilities having highly classified information which was believed to require continued personnel security protection against espionage.

3. Redistribute military property excess in overseas theaters and bases for period II, as well as in the Zone of Interior; initiate and implement policies and procedures for redistribution of all property declared surplus.[40]

Supplies en route to the Pacific and Asiatic theaters had to be diverted and disposed of, and all requisitions canceled. Space for storage of these items had to be provided on a continuous basis. Civilian supplies had to be procured and shipped as scheduled, and surplus property had to be disposed of or stored.

On V–J Day, these plans were placed in operation.

LOGISTICAL SUPPORT OF COMBAT AREAS

Because logistics is designed to support the tactical effort, it is not surprising that marked differences developed in different theaters of operations. The war in the Pacific was largely an island-hopping war with multiple and repeated naval, air, and amphibious operations. On the other hand, the war in Europe and Africa was largely ground warfare over more expansive areas. Naval and amphibious combat operations were preludes to ground warfare involving large numbers of troops on broad fronts resulting in large numbers of casualties. Operations in the Mediterranean, a combined British and American theater, were an alternating combination of amphibious and landmass fronts that began with the landings in North Africa, then shifted north into the Mediterranean Islands and on to the European Continent. Because of the widely separated landings and areas of combat, a decentralized type of supply system prevailed until forces were concentrated on the Italian Peninsula.

[40] Memorandum, Brig. Gen. Edward Reynolds, to Director, Industrial Demobilization, ASF, and others, 6 Aug. 1945, subject: Supply Service—Interim Plan—Period II (Readjustment and Demobilization).

Medical Supply in Europe

Many factors influenced the evaluation of the medical supply system in the European theater. One of the early problems was the constant changing of operational plans and priorities for the theater as the fortunes of war, worldwide, ebbed and flowed. The operations were mounted in England, a strong and industrialized ally. There was no language barrier. Even though the United Kingdom and its industry were already burdened with prosecuting the war against the Axis, our Government believed that the British could supply U.S. forces with large quantities of material through "reverse lend-lease" and thus conserve shipping space.

Another important factor was that the war was fought on a large landmass with relatively good rail and road networks, and with existing telephone and telegraph systems providing a basis of rapid communication. As the war progressed, more and more hospitals and depots were established on the Continent, although throughout the war hospitals and depots in the United Kingdom continued to support the operations.

Maj. Gen. Paul R. Hawley (fig. 6) was not only chief surgeon of the theater, but he also headed the medical service of the Communications Zone. As the war progressed, he had tremendous medical resources—personnel and material—under his control. General Hawley, a man of great ability and drive, was strong enough and wise enough to use them effectively. The fact that the entire medical service for the U.S. forces in the European theater was under one chief aided immeasurably in the successful medical support of the war.

From the outset, professional influence was strong. General Hawley surrounded himself with prominent and outstanding specialists in every clinical field, who actively influenced the techniques and the quality of medical and surgical care. These consultants were of great value in developing supply policies, advising on requirements, and especially in teaching their professional colleagues in hospitals some of the rudiments of Army supply. Many medical officers, most of them fresh from civilian life, had no concept of what was available, of Army supply terminology, or of how to go about obtaining what they needed. Frequently the weakest link in the supply chain was between the hospital or unit medical supply officer and the doctor, both of whom were frequently inexperienced in Army supply. The needed item was in the supply room or warehouse but the supply officer did not know its use and the doctor did not know it was there, what it was called, or how to get it.

Identification was often a serious problem. Doctors were familiar with drugs by their common or trade names whereas the Army carried them under their official U.S.P. or N.N.R. titles. Likewise, surgical instruments and other equipment, not infrequently, were known in different sections of the United States by various names, which were dissimilar to Army nomenclature. General Hawley's consultants were given an orientation and each became familiar not only with the supply items of his specialty, but also with mechanics of the

FIGURE 6.—Maj. Gen. Paul R. Hawley, Chief Surgeon, European theater.

overall medical supply system. Time and again on their visits, they were able to bridge the gap to medical installations and see that the item was put in the hands of the professional man.

The long evacuation policy—120 days during most of the war—resulted in a large patient load and much definitive treatment within the theater. At the height of the operations, the medical service in the European theater had 192,000 beds [41] occupied by patients. This was reflected in huge requirements for medical supplies.

A favorable factor was the availability of prisoner-of-war labor. In the United Kingdom, both Italians and Germans were utilized, whereas on the Continent only Germans were available. Many were skilled or semiskilled men, accustomed to hard work. Usually employed under their own noncommissioned officers, prisoners proved to be a valuable adjunct to the medical service.

Because of the above-mentioned factors, plus many others, the medical supply system in the European theater developed along strongly centralized lines, and was ultimately patterned closely after the Zone of Interior system. The Supply Division of the Chief Surgeon's Office closely controlled all opera-

[41] Monthly Progress Report, Army Service Forces, 28 Feb. 1945, Section 7.

tions. It enunciated policies and procedures, determined theater requirements, requisitioned supplies from the United States, distributed stock among the depots, and supervised depot activities. Although the theater, behind Army boundaries, was divided into advance, intermediate, and base sections, these geographic commands exercised little influence beyond assistance to the medical supply operation. In other theaters of operations where geographic commands were widely dispersed, the reverse tended to be the situation, resulting in decentralized systems in which the real authority rested with the geographic area commanders.

Medical Supply in the Pacific

In the Pacific, in addition to vast distances and small, scattered land areas, there were extremes of climate ranging from the cold, damp conditions of the Aleutians to the tropical islands of the central Pacific. Tropical diseases called for special drugs and the hot, damp atmosphere of the Solomons and other island groups demanded special equipment. At the same time, shipping space was at a premium while central depots were necessarily remote from the scenes of combat. Until the final stages of the war in the Pacific, scarcity was the rule so far as medical supplies were concerned.

One contributing factor in this situation occurred even before the war itself. By way of preparation for the emergency that appeared clearly in the making, a substantial portion of the Medical Department's reserve supplies had been sent to the Philippines. Equipment for four general hospitals and quantities of dressings, drugs, and instruments were on hand. Personnel was inadequate for combat, but commendable progress had been made in training Filipino physicians and enlisted men to augment U.S. military medical personnel. Plans for deployment were complete. Medical leadership was present and there is every indication that excellent medical teamwork was exercised in the preattack period. A medical supply depot was functioning and a medical regiment was available. Additionally, in accordance with plans, the equipment for one general hospital was in storage at Limay, Bataan.

When the Philippines were attacked, Sternberg General Hospital (fig. 7) became a medical center in a matter of days and accepted evacuees from the station hospitals at Clark and Nichols Fields. But, on 24 December, according to plan, movement of troops to the Bataan Peninsula was begun and medical personnel, supplies, and hospitals had to be moved. These were the experiences that our troops were to face in other areas of the South Pacific and Southwest Pacific over the next 4 years: poor roads or none at all, jungle, insectborne diseases, infectious diseases, scanty foods, ferocious combat, mud, rain, dust, discomfort, refugees, and the necessary improvisations to cope with all of these problems.

In December 1941, Maj. O.V. Kemp, MAC, an aggressive medical supply officer (for Col. Wibb E. Cooper, MC, Department Surgeon) with foresight and intelligence had purchased many consumable medical supplies from the merchants in Manila—antimalarial drugs, instruments, gauze, and cotton.

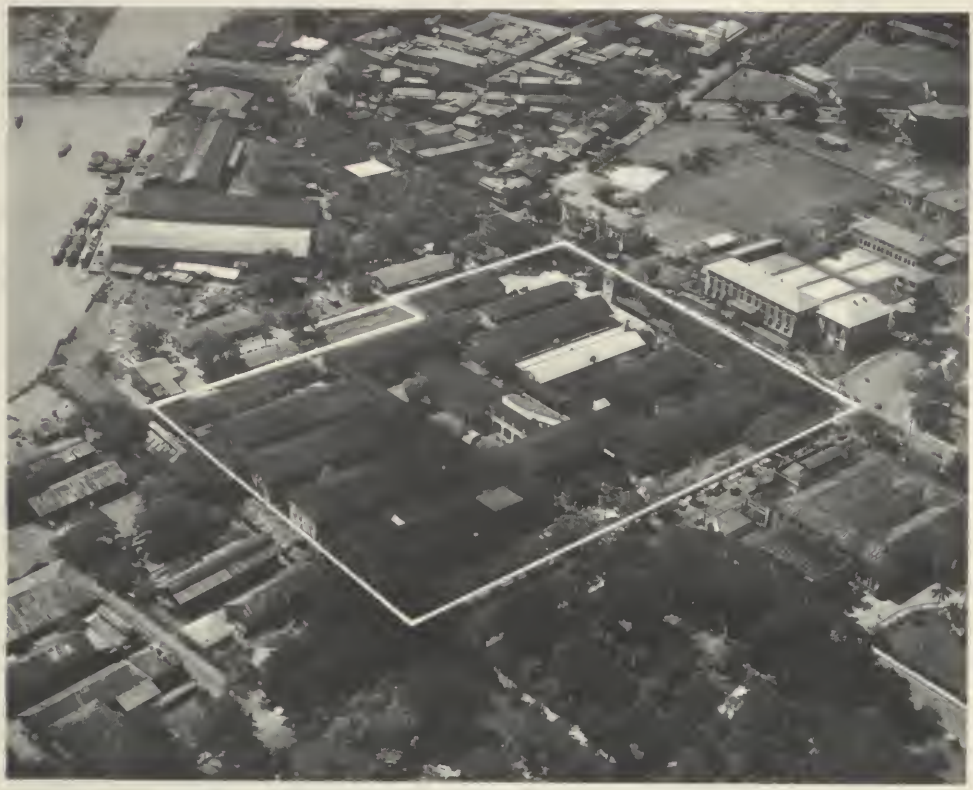

FIGURE 7.—Sternberg General Hospital, Manila, Philippine Islands, 1940.

These were stored in Bataan and Corregidor and, without doubt, augmented the ability of medical troops to carry on. During the combat on Bataan, many medical chests had to be abandoned during the retreat. One general hospital was captured by the Japanese and, consequently, available medical supplies were depleted.

The fall of the Philippines was inevitable because the United States was unable to reach them with the necessary augmentation force. But this was not fully realized by our troops, and their performance was exemplary. On 9 April 1942, medical personnel were caring for 7,000 patients in Hospital No. 1 which was captured on that day. Progressively, quinine and Atabrine (quinacrine hydrochloride) had been depleted until these drugs were not available for malaria prophylaxis, and only limited amounts could be used for treatment. Reinfections were almost immediate to those who obtained temporary cure. Food became a serious problem, and from 1 April 1942 until surrender, the allowable calories per man had been reduced to no more than 900. There were no vitamins and no gas bacillus serum. From 9 April until 10 May 1942, Corregidor (our remaining garrison) carried on. The medical units with the troops rendered as much medical care as possible and the serious cases were

transported to the Malinta Tunnel Hospital. This tunnel was 1,400 feet long and at intervals twenty-five 400-foot laterals branched out from the main tunnel. The tunnel was strengthened with reinforced concrete and equipped with a ventilation system. It served well in these last days to give such medical care as could be rendered under the continuous bombardment by the Japanese.[42]

In the Visayan Islands and Mindanao, the same shortage of antimalarial drugs was recorded. Food, however, was plentiful. One well-supplied hospital, earmarked for storage at Cebu and which was intended to be the nucleus for a large general hospital, was lost when the U.S.S. *Corregidor* was sunk. This was somewhat of a disaster to medical supplies, particularly since the hospital was stated to be so well stocked.

Nothing but praise can be recorded for the medical supply personnel in the Philippines during the presurrender days. Requirements had been anticipated. Stocks were on hand and stored in strategic locations. Others had been requisitioned. Most serious shortages were in antimalarial drugs. But these were strategic items in world supply and, in situations such as the Bataan defense, determination of what is enough of these drugs and the discipline to enforce their proper use present most difficult problems. The civilian Japanese population and our own troops were afflicted in the same manner, and losses of vital items at such a time and in such circumstances are almost impossible to prevent.

After the Philippines, the medical supply story in the Pacific was one of difficulties and delays, but of ultimate building up of necessary stocks to sustain the offensive that began in August 1942 with Guadalcanal and slowly gathered momentum until the abrupt ending of the war by the use of the newly devised atomic bombs.

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[42] For a more detailed account of the medical side of the evacuation of the Philippines, see Daboll, Warren W.: The Medical Department: Medical Service in the Asiatic Theater. United States Army in World War II. The Technical Services. [In preparation.]

Part I

PROCUREMENT AND DISTRIBUTION OF MEDICAL SUPPLIES IN THE ZONE OF INTERIOR

CHAPTER II

Central Procurement of Medical Supplies

MEDICAL SUPPLY UNDER THE ARMY PROGRAM

When the United States entered the war, procurement of medical supplies and equipment was still based on the depot replenishment system, modified to approximate the needs of an expanding army. Quantities purchased were sufficient to replenish depot stocks and to equip new troop units as they were raised, but the computation of maintenance and replacement needs had supply officers treading the thin ice of prophecy. There had been no experience to furnish guidelines for conjecture, and the procurement difficulties of 1940–41 were magnified as more and more men were brought under arms in the early months of 1942. Purchase authorizations were issued for such enormous quantities of some items that manufacturers were astounded at the size of the orders. Within a few weeks their judgment would be confirmed by cutbacks in procurement; but, very frequently, increased purchase authorizations would send total requirements to a new height. In other items, a hand-to-mouth policy would be adhered to, and a small purchase authorization would be issued. This would be followed by another and still another, until as many as 15 separate purchases of a single item had been authorized within a short period of time.

Role of the Army Supply Program

To remedy the defects which had appeared in the procurement programs of nearly all the technical services, the Army Supply Program was instituted in July 1942. Prepared each 6 months, this program for the Medical Department was a computation of quantities required in approximately 4,500 medical items. It was intended to present an orderly buying program, based upon carefully estimated requirements. Stop-and-go buying, which had so confused procurement in the earlier period, would be eliminated; and contractors would receive an overall picture of the Army's needs.

The Army Supply Program played a vital role in World War II logistics, going far to prevent confusion, duplication, and competition between Army and Navy and among the technical services; it provided a blueprint for military procurement planning. The Medical Department had a heavy stake in its success because medical supply cataloged a wide range of items common to one or more of the technical services and, of course, to the Navy. Under the Army Supply Program, the technical services could determine their respective requirements on the same troop basis, with a unified strategic plan in view. The program provided for purchasing on the authority of a single correlated

program. From a complete absence of coordination between Army and Navy, certain specialized items were now procured by one service for both.

Although items of medical supply were regarded as secondary, low in unit value, and insignificant in relation to total War Department expenditures, the Army Supply Program still attempted to classify them by order of importance. In terms of raw materials, facilities, funds, and military necessity, some 300 Medical Department items were designated as "critical" and 400 as "essential." Beginning with the program of 1 August 1943, these two categories together became part A, defined as primarily tactical equipment, with an added part B consisting of "miscellaneous and expendable supplies." The Army Supply Program for calendar year 1944, as outlined in the 1 August 1943 document, listed Medical Department items aggregating $175,181,922 under part A, and items valued at $118,089,828 under part B.

These figures were somewhat modified in the program of 1 February 1944. Part A was increased to $179,026,115 while part B was reduced to $75,542,268. These figures reflect the buildup of the Army and the heavy requirements for initial supply of the equipment type items that represented the bulk of part A. The part A items were about 4 percent of the total number of medical supply items on which some degree of stock control action was exercised. Undoubtedly, the Army Supply Program was a great improvement over the loose, uncoordinated efforts which preceded it. It infused into procurement an air of stability and steadiness that was reassuring. But it possessed one important disadvantage, which, within little more than a year and a half, caused the Medical Department to abandon it as a procurement objective. Since it was prepared at widely separated intervals (every 6 months), it could not keep step with changing needs. Moreover, the advance period being contracted for was from 1 year to 18 months. Because of this long lead time, items on which short supply developed were not given attention until the situation became serious. Similarly, where the issue rate was not so high as the Army Supply Program anticipated, excess stocks developed which made contract terminations necessary.[1]

The Delivery Needs Plan

To bring purchases more nearly in line with actual stock conditions, the Delivery Needs Plan was put into effect in the latter part of 1943. A Delivery Needs report was prepared at 2-month intervals by the Distribution and Requirements Division, Supply Service, based upon the requirements figures included in the Army Supply Program. The figures were adjusted, however, by subtracting from them the current stock-on-hand and due-in from procurement figures which were obtained from depots. Product of the skill and imagination of Mr. Herman C. Hangen, on loan from J. C. Penney Co., and Mr. Mead M. Messick, on loan from Montgomery Ward & Co., the Delivery

[1] (1) Army Supply Programs, Section I, Equipment, Ground (Medical), 1 Feb. 1943, 1 Aug. 1943, and 1 Feb. 1944. (2) Annual Report, Army Medical Purchasing Office, fiscal year 1944.

Needs Report was the first long step toward an integrated central stock control system. Initially, this was prepared manually in Stock Control by one officer and one clerk. It commenced with an electric accounting machine listing by item number and nomenclature. The source material, abstracted from the Distribution Work Sheets, consisted of the printed requirements, back orders on issue requisitions, and ready assets, which included stocks on hand or due-in by transfer. Dues-in from procurement were not included, but an effort was made to ascertain that dues-in from transfer were accurate. The printed requirements reflected 6 months' anticipated consumption, both domestic and overseas, and the level established to support the assembly and Medical Maintenance Unit programs.

The Delivery Needs Report also became the guide to procurement for items requiring expeditious action to speed up deliveries if contracts were in being, and similarly provided a list of items for which purchase action should be taken in the order of their urgency. A supplemental advantage was provision of a guide for establishment of delivery schedules, as it indicated the relative stock position of all items. This same feature of the report later provided means of identifying excesses and thus became a basis for procurement cutbacks.

Of greater importance and for the first time, Requirements, Procurement, and Stock Control personnel had a common point of reference by item, from which they could take action. As a byproduct, Resources personnel had available to them an item breakout from which they could better determine raw material needs. In those days of critical shortages and tight controls, the Delivery Needs Report provided invaluable detailed data for justification of Medical Department raw material requirements. The timely availability of medical supplies in the bitter fighting days of 1944–45 was largely the product of this simple practical device. The system was more successful than the Army Supply Program, which it closely approximated, except that changes in stock conditions were considered every 2 months; but, even with this improvement, it did not reflect changes in needs or stock conditions often enough to provide a reliable procurement program. The basic problem continued. Procurement was not being coordinated with needs as reflected in current issues.

Stock Level Purchasing

To solve the problem just described, the system of Stock Level Purchasing was instituted in February 1944, and continued in effect during the remainder of the war. Since this system depended upon close cooperation between stock control and procurement, the Inventory Control Branch was moved from Washington, D. C., to New York, N. Y., in November 1943, and the remainder of the Stock Control Division was subsequently transferred.

Stock Level Purchasing employed the same rates of call and the same maintenance factors used in the Army Supply Program, but the purchase requirements thus obtained were subject to frequent review and revision. The

object of the system was to maintain a predetermined stock level in all depots. New stocks of any item were ordered by the procurement office whenever it appeared that stocks on hand and on order, less probable issues during the period required for delivery (lagtime), would fall below the established level. The amount of each purchase was determined by a conference between the buyer and stock control officers, and it depended upon conditions affecting the manufacture of the item. When raw materials and manufacturing facilities were readily available, small purchases frequently repeated would be authorized. If the manufacturing process was difficult, a large quantity would be authorized for delivery scheduled over a longer period of time.

All items were reviewed monthly by an examination of the Consolidated Stock Report, which consisted of semimonthly stock reports of individual depots. In addition, specific items which were in short supply were reviewed more frequently. Thus, the shortest practicable time elapsed between development of a need and placing an item in procurement. The system also eliminated peakloads in purchasing activity because a relatively small number of items was purchased monthly. Since the period contracted for was reduced to a minimum, contract terminations became less frequent.[2]

The purchasing plan just described represented a return, in a modified form, to the Depot Replenishment System. Greatly improved recordkeeping and the more frequent submission of reports helped to make its operation smoother and its success more nearly complete, but the major difference was the issue experience that was now available on which to base purchase requirements. When experience was inadequate, serious difficulties still resulted. For example, during the first 9 months of 1944, the issue of Fraser's Solution—an iodine preparation used in the treatment of athlete's foot—was relatively small, approximating 10,000 bottles a month. In October 1944, with the launching of the Philippine campaign and the simultaneous arrival of the rainy season in the archipelago, requisitions increased so greatly that port shortages of considerable size began to appear. Purchases of the solution were immediately increased so that, by the end of November, 132,000 bottles were under contract for immediate delivery and an additional 250,000 bottles were ordered for delivery during the first 5 months of 1945. But, in the middle of December 1944, very large requisitions from overseas increased port shortages by 650,000 bottles. Since there had been so little previous activity in this item, the Supply Service was unable to cope with such heavy demands.[3] Neither raw materials nor manufacturing facilities were available to produce the required quantities, and it was not until February 1945 that the situation was brought under control.

The Stock Level Purchasing System was satisfactory so long as there were no great and sudden fluctuations in issue; but there was always the possibility that unexpectedly large requisitions would deplete depot stocks to a

[2] (1) Hornbacher, Arthur: Determination of Purchase Requirements. [Official record.] (2) Annual Report, Inventory Control Branch, Supply Division, OTSG, fiscal year 1944.

[3] See footnote 1(2), p. 36.

point far below the reorder level, and that months would elapse before deliveries from contractors would replenish the supply. If a system of computing accurate requirements could have been developed, the problem would have been solved, but the available maintenance factors were too unreliable to guide procurement. As the war closed, maintenance factors based directly upon Zone of Interior and overseas issues were computed, in the hope of providing a sounder basis for the estimation of requirements during a future war.

F.O.B. Origin Contracts

Until early 1944, virtually all purchases were F.O.B. destination. After that date, most contracts were based on delivery at the point of origin. This change, instigated by the Inventory Control Branch, substantially increased the administrative workload of the Army Medical Purchasing Office because the cost of transportation from factory to depot varied with the location of each site.

On the other hand, under terms of F.O.B. destination, cost comparison by depot was relatively simple. Scheduling and destination, moreover, were part of the contract and, in general, one document accomplished all that was required from the buyer's viewpoint. Under F.O.B. origin terms, contracts specified quantity and shipping schedule in total, which required the buyer to maintain an open contract file and to contact the Inventory Control office 30 to 60 days before each scheduled shipping phase for the quantity breakout by specific depot.

Like the earlier modification of the Army Supply Program procedure by the Delivery Needs Report and the later substitution of the Stock Level Purchasing System, the replacement of the F.O.B. destination by the F.O.B. origin contract was a step closer to the objective of calculating requirements on the basis of the most recent experience and scheduling deliveries against the latest stock position. Better distribution of stock by the depot was made in April, under F.O.B. origin contracts, than could have been made in the preceding January because 3 months' issue demands could drastically alter the depot stock position. Furthermore, last minute diversions of F.O.B. origin contracts could be effected with greater ease, and maximum benefits were gained by the use of Government bills of lading. Probably the most basic and lasting effect of F.O.B. origin contracts was involvement of buyers in operations, as part of the supply team.

Army Service Forces Circular No. 67

The Army Supply Program, which was revised on 1 February and 1 August of each year, was the basic requirements guide. With little or no warning, the Army Supply Program of 1 February 1944 was replaced by procedures contained in Army Service Forces Circular No. 67 as of 7 March 1944.[4]

[4] Smith, R. Elberton: The Army and Economic Mobilization. United States Army in World War II. The War Department. Washington: U.S. Government Printing Office, 1959, p. 162.

This circular provided for comprehensive control of procurement inventory, and disposal of excesses; and established a 30-day cycle of reviews as compared to the semiannual Army Supply Program.

The major components of the Circular No. 67 system were: (1) calculation of 12 months' estimated issues, including anticipated initial supplies and maintenance for Army and Lend-Lease, plus Civil Affairs and any other known issue requirements; (2) total authorized stock level, which comprised depot stock levels in the Zone of Interior and in theaters of operations, contingency reserve, strategic reserve, and production reserve; (3) a supply and demand status which was determined by application of the 12 months' issues plus authorized stock levels minus the sum of stock on hand plus quantities on contracts undelivered; and (4) a determination of excesses where assets in (3) were greater than calculated requirements from (1) and (2).

Circular No. 67 was a part of the general evolution. It had been recognized that the slower and more rigid Army Supply Program had outlived its usefulness. The period of the big buildup in forces was nearly over and the shape of offensive operations that led to victory was in view.

PLACING PURCHASE ORDERS

After determining the quantity of a needed item, the next step in the procurement process was placing the order, either through competitive bidding or through negotiation. As in the prewar period, this function was performed in the field by procurement officers who were given broad authority in the signing of contracts. In 1941, purchasing and contracting officers were authorized to approve contracts in amounts less than $500,000; during the following year, the amount was increased to $1 million. Contracts which exceeded those limits had to receive the approval of The Surgeon General.[5]

Contract Negotiation

The system of plant allocation in use before the United States entered the war was quickly outmoded by plant conversions and by the enormously expanded needs of the whole war program. Similarly, the Bidders' List of prewar days became anachronistic when competitive bidding ceased to be mandatory. After the middle of 1940, the bulk of Medical Department purchasing was by negotiated contract, in accordance with War Department policy which authorized the placement of orders without advertising for bids "in all cases where that method of procurement will expedite the accomplishment of the war effort." During the first quarter of 1942, negotiated purchases totaled $25 million while contracts signed on the basis of competitive bidding amounted to less than $1 million.[6]

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[5] Report on Administrative Developments, Control Division, OTSG, 1 Dec. 1942. [Official record.]

[6] (1) Memorandum, Under Secretary of War Robert P. Patterson to Chiefs of Services, 17 Dec. 1941 (P. & C. General Directive No. 81), subject: Decentralization of Procurement. (2) Hornbacher, Arthur: Report of Procurement Operations, 1 Jan.–31 Dec. 1942. [Official record.]

Before actual negotiation of a contract, letters of intent were frequently issued, which carried applicable preference rating and directed that production be initiated before formal signing of the legal instruments. New forms were devised in the New York Procurement Office, eliminating much unnecessary material and speeding the placement of orders by 2 or 3 weeks.[7]

There was close coordination in the work of the various divisions of the New York Procurement Office. The Administration Division maintained records of purchase authorizations and contracts; these were made available to purchasing officers at regular intervals to inform each buyer as to the procurement status of each item for which he was responsible. The Administration Division also reviewed open contracts to assure itself that shipments were made as scheduled, and that they were received and acknowledged by the depots. It was necessary, especially during 1943, to schedule production so that scarce raw material could be made available for the items most urgently needed. This involved care in making contracts and in stipulating delivery dates when the items contracted for were composed of critical raw materials. Each contract was analyzed, and realistic schedules were prepared to guide the contractors in establishing their production schedules.[8]

To meet the war-expanded needs of the Medical Department, new contract forms were devised and put into effect later in 1942. The most important, War Department Contract Form No. SG 1, was used from September 1942 until the end of the war for "formal contracts" involving procurement of medical supplies and equipment in amounts not exceeding $1.5 million.

For long-term supply contracts, the Medical Department used War Department Contract Form No. SG 2, which was put into effect in October 1942. This form was not widely used at first, but it soon demonstrated its value, especially in the procurement of surgical dressings and penicillin. In the contract, a price was fixed for a certain quantity to be delivered before a stated date; the balance of the quantity under contract was to be delivered as needs developed. The unit price of each delivery was to be fixed by agreement between contracting officer and contractor. In no instance, however, was the price to increase more than 20 percent.

War Department Purchase Order Form No. SG 3 was used for procurement of supplies, repairs, and services valued at less than $2,000, and subsequently increased to $10,000. Known as an "informal contract" because it did not require the written acceptance of the contractor, this form expedited the delivery of small purchases which were needed quickly.

For the peculiar problems involved in processing blood plasma, a special contract was devised by the legal officers of the Army Medical Purchasing Office. In addition to the special clauses, this contract contained all standard

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[7] (1) Letter, Lt. Col. F. C. Tyng, MC, to Under Secretary of War, 22 Dec. 1941, subject: P. & C. General Directive No. 81, Office of the Under Secretary of War, December 17, 1941. (2) Hornbacher, Arthur: Purchasing Methods—Negotiations. [Official record.]

[8] See footnote 1(2), p. 36.

provisions of the other contracts designed to protect the Government's interest.[9]

In devising these contract forms and in negotiating between buyers and contractors, the legal officers of the procurement districts and, later, of the Army Medical Purchasing Office, took a prominent part. Their services were useful in the interpretation of statutes and procurement regulations, in the establishment of routines for the scrutiny of contracts, and in the interpretation and modification of contract provisions. One of the most important tasks was to acquaint the contracting officers with the legal limitations upon their authority and with the embarrassments and complications that would ensue if mistakes were made in the obligation of public funds.[10]

Price Analysis

Closely connected with the negotiation of contracts, price analysis and renegotiation were used by the Medical Department to control prices. Late in 1943, the price analysis program began. With few exceptions, purchasing officers required contractors to include cost data on special forms when submitting bids for orders in excess of $10,000. Most manufacturers vehemently opposed this method of doing business and, for a while, resisted all efforts of purchasing officers to obtain cost data. There were numerous telephone calls and visits from contractors, who sought advice on how to fill in the forms. Some declared that they did not know their costs. Others submitted bids without cost information. A few simply refused to bid. After much argument and persuasion, purchasing officers succeeded in convincing the contractors that the new system did not aim to eliminate profits or to disseminate trade secrets, that its only object was to keep profits within reasonable limits and thus avoid renegotiation. By spring of 1944, most Medical Department manufacturers were cooperating, and price analysis was in successful operation.[11]

As the cost data were examined by purchasing officers, proof was available that considerable overpricing existed and that excessively large prices were resulting. Only one item was analyzed in November 1943, but that analysis made possible a reduction of 1.2 percent in the quoted price and a saving of $1,036. During 1944, the number of items analyzed each month varied between 17 and 115 and showed a steady upward trend. Price reductions varied between 1.5 percent and 69 percent and totaled $1,657,027.30 for the year. During the first half of 1945, savings amounted to approximately $1.4 million. This is scarcely more than an indication, however, of the total savings effected by price analysis. When a quoted price was reduced through analysis of cost figures, subsequent purchases were effected at the lowered figure. Thus, the savings were cumulative and were much larger than the foregoing figures indicated. It was observed, also, that price analysis effected economies in another way. For example, when a manufacturer submitted a quotation on one occa-

[9] Hornbacher, Arthur: Purchasing Methods—Contracts, 1941–45. [Official record.]
[10] See footnote 1(2), p. 36.
[11] See footnote 1(2), p. 36.

sion, he was requested to forward cost data. He complied and, at the same time, lowered his price. An analysis of the cost data resulted in a further reduction. It is significant that the contract prices of Medical Department items declined 24.4 percent during the period 1 July 1944 to 30 June 1945.[12]

Renegotiation of Contracts

Renegotiation of contracts was another and more vigorous method of reducing the cost of medical supplies and equipment. Unlike price analysis, this was a remedy, not a preventive; it recouped excessive profits after completion of the contract and delivery of the supplies. Renegotiation was based upon the assumption that manufacturers, when producing new items or tremendously increased quantities of old items, could not foresee their costs and thus charged prices that resulted in excessive profits. But after the supplies had been manufactured and delivered, cost data were available; then, it was possible to determine the prices which should have been charged. Consequently, a literal renegotiation of contracts, with full information was at the disposal of both the contractors and representatives of the Renegotiation Division, Supply Service. It should not be assumed, however, that hard-and-fast rules were applied in these proceedings and that each contractor's profits were reduced to the same percentage figure. If a contractor's costs were high and if he had made no sincere efforts to reduce them, the percentage of profit allowed was correspondingly reduced. But if he had kept down his costs, the percentage allowed was higher. Contractors who had sustained losses or had made very small profits on other governmental orders, might be permitted a larger profit on the contract being renegotiated.

All pertinent circumstances and conditions were considered and each case was settled on its own merits. The work required a thorough study of a contractor's business with the Medical Department, including his costs, prices, profits, promptness in making deliveries, and corporate structure. Some contractors showed a pronounced tendency to inflate their costs, and thus reduce their percentage of profit, by including expenses having no direct relation to the fulfillment of the contract. It was necessary, therefore, to exercise great care in determining the true costs.

The Renegotiation Division was established in July 1942 and continued in operation during the remainder of the war. During fiscal year 1943, it initiated renegotiation proceedings on 229 Medical Department contracts, of which 82 were completed before the end of the fiscal year. These completed cases resulted in refunds amounting to approximately $4.5 million.

During fiscal year 1944, the number of cases increased considerably, and refunds recovered amounted to $7.5 million, or 5.8 percent of the total purchases involved. Many companies assigned to the Surgeon General's Office were found to have realized no excessive profits and were accordingly cleared

[12] (1) See footnote 1(2), p. 36. (2) Annual Report, Army Service Forces, fiscal year 1945, p. 214. The overall decline in prices for the Army Service Forces during the same period was only 3.2 percent.

without refunds or price adjustments. The companies thus cleared realized an average profit of 5.1 percent. The companies from which refunds were obtained had an unadjusted profit of 18.8 percent. This was reduced by 11.32 percent, leaving an adjusted profit of 8.5 percent. This trend continued during fiscal year 1945, in which more than 400 contracts were renegotiated, with refunds amounting to nearly $10 million. The unadjusted profit, 20 percent, was reduced after renegotiation to 10.17 percent. Thus, during the war period, renegotiation reduced Medical Department expenses more than $20 million.[13]

No item of medical supply created more interest than blood plasma, and none was pursued more vigorously by renegotiation officers.[14] The original price for processing the 250-cc. unit of blood plasma ranged from $6.75 to $7.50. As of 1 September 1942, the price varied between $4.35 and $7.25, the lower price being that of Eli Lilly and Co. In October 1942, Lilly reduced its price to $2.50 and voluntarily refunded $25,000 on past deliveries. An additional refund of $186,000 was made in February 1943. Since Lilly had declared that the price of $2.50 per unit represented its cost of production, exclusive of general expenses, renegotiation officers had reason to suspect that other processors were making excessive profits. The situation was rendered serious by the fact that requirements were large and the necessary production depended upon public donations of blood. If excessive profits were revealed, the entire blood plasma program would be adversely affected.

The Renegotiation Division rightfully concluded that the blood plasma program required exceptional treatment to assure that no scandal hit the Medical Department over excessive profits. They proceeded cautiously, acquiring the help of outsiders to enhance accuracy of findings. Unit prices of blood plasma declined sharply during the war period, the decline being attributable to an undeterminable extent to increased volume of production and improvement of techniques of accounting and reporting by the various laboratories, as well as attention to costs and profits.

Payments to Contractors

It was important in executing a contract to pay contractors promptly when performance was complete. During the war, this was not always done. Before 1 January 1943, when a contract was issued, an Army finance officer was designated to make payment, and a copy of the instrument was forwarded to that office. After supplies were shipped, the contractor sent his invoices to that finance office for matching with the receiving report from depots. When these three documents—contract, invoice, and receiving report—were assem-

[13] Annual Reports of the Renegotiation Division, Supply Service, OTSG, 1944 and 1945. The 1945 report, used by Capt. Richard E. Yates, MAC, in the preparation of the first draft of this study, is no longer available. Closely related to renegotiation was enforcement of the Royalty Adjustment Act which eliminated excessive royalties on patents and resulted in the recovery of approximately $5 million on Medical Department contracts.

[14] Medical Department, United States Army. Blood Program in World War II. Washington: U.S. Government Printing Office, 1964.

bled, the finance office drew a check in favor of the contractor against Medical Department funds.

During the period of increased procurement in 1942, this system demonstrated flaws. In addition to the increased volume of work hampering prompt payment, delays were attributable to tardiness of the depots in forwarding reports to the finance office and to loss of contractors' invoices. The main delay in payment, however, was caused by differences in quantity actually shipped by a contractor from that called for in the contract. If an over or short shipment had been made, the finance office would not pay the account until proper certification was made.

AID TO MANUFACTURERS

During the fiscal year ending 1 July 1942, contracts were placed with 700 manufacturers. Although this represented a distinct increase over previous years, it was dwarfed by the great expansion of the following year, when 2,500 Medical Department contractors held a total of 25,000 contracts. This increase in the number of manufacturers was caused by the conversion of numerous factories to the production of medical supplies, and by a much fuller use of small manufacturing establishments—a development resulting, in part, from pressure exerted by the Smaller War Plants Corp. During fiscal year 1943—the peak year for procurement—contracts placed with small war plants totaled $220 million, or 56 percent of all Medical Department procurement. The remaining years of the war witnessed no increase in the number of contractors nor any considerable expansion of the size of plants, except those devoted to the production of penicillin, petrolatum dressings, artificial limbs, and mechanical prophylactics.[15]

Plant Expansion

Even before the United States entered the war, the expansion of manufacturing facilities required financial aid from the Government—either loans from the Defense Plant Corp. or certificates of necessity, which allowed the manufacturer to amortize the cost of expansion over a 5-year period or during the course of the emergency, whichever was shorter. In 1940, a "very small percentage" of Medical Department facilities applied for certificates of necessity, but during 1941, a considerably larger number sought to amortize their expansion in this manner. Working through the Under Secretary of War, the Medical Department used its influence to obtain the certificates of necessity from the Treasury Department. By the end of 1943, Medical Department contractors had expanded their plants sufficiently to care for the abnormal needs of the war, except in the production of litters, artificial limbs, penicillin, gas gangrene antitoxin, blood plasma, and other medical items which science

[15] (1) Annual Report, Supply Service, OTSG, 1943. (2) Annual Report of The Surgeon General for the Commanding General, ASF, 1943. (3) Annual Report, Liaison Branch, Purchases Division, Supply Service, OTSG, fiscal year 1945.

developed and which the changing military situation required. Several penicillin plants, for example, were financed with public funds supplied by the Defense Plant Corp., but the greater number were built by private capital upon the basis of certificates of necessity. During the period 1 July 1943 to 30 June 1944, 136 applications for the certificates were considered by the Supply Service and forwarded to higher authority. On each application, a report was prepared showing the importance of the medical item to be produced, the relationship between requirements and existing facilities, and the suitability of the proposed facility.[16]

In addition to an increase in the number of contractors and the expansion of plants, the production of urgently needed medical supplies was augmented by the establishment of the 24-hour workday and the 7-day week. Within less than 10 days after the attack on Pearl Harbor, four great chemical companies which produced raw materials for pharmaceuticals were put on a 24-hour day. Mills producing gray goods for surgical dressings had been on three shifts for several months, and the surgical instrument manufacturers had worked two shifts per day for more than a year. Only lack of skilled personnel prevented the addition of a third shift. The drug industry and other manufacturers of commercial-type items did not work to maximum capacity for their production was more than adequate for all Army requirements.[17]

Procurement officers of the Medical Department soon discovered, however, that neither plant expansion nor an increase in the workday could insure the full production needed by the war effort. In the rapidly tightening economy, shortages of manpower, machine tools, and raw materials were becoming increasingly acute. Consequently, an important duty of procurement officers was to aid manufacturers in obtaining these essential components of production.

Substitutions for Scarce Materials

The earliest and the most troublesome problem throughout the war period grew out of the shortages of essential raw materials. Scarcities of drugs and metals which had previously been imported were anticipated and some provision had been made for substitutes, but shortages in domestically produced raw materials were not expected. Mobilization plans did not envision a war of such magnitude that the huge steel, copper, aluminum, and other material resources of the United States would be inadequate. Early in 1942, however, it became clear that the mighty military effort then being developed would produce severe shortages in the three key metals as well as in many other raw materials. The remedies were obvious and were quickly applied. They consisted of conservation and centralized control.

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[16] (1) Memorandum, Lt. Col. C. F. Shook, MC, to Lt. Col. F. C. Tyng, MC, 1 Mar. 1941, subject: Report Upon Senate Resolution 71. (2) Annual Report, Liaison Branch, Purchase Division, Supply Service, OTSG, fiscal year 1944.

[17] Memorandum, Lt. Col. C. F. Shook, MC, to Maj. Charles J. Norman, Inf., 15 Dec. 1941, subject: Maximum Hours of Work.

As shortage became apparent, specifications of Medical Department items were revised wherever practicable to eliminate scarce raw materials. Hospital equipment and furniture, formerly made of corrosion-resistant steel, were constructed of iron, wood, and other less critical, but shorter-lived, substances. The laminated paper and lead foil covering of the first aid packet proved superior to both the brass and steel it replaced, but galvanized iron was less than satisfactory as a substitute for brass in the manufacture of sterilizers. The plastics used instead of metals in such items as food trays and bottle tops wore out faster than the more durable materials originally used, as also did the enamelware that replaced stainless steel and aluminum in bedpans, cooking utensils, and other items of hospital equipment. The litter pole, between early 1942 and the end of 1943, ran the full cycle from aluminum to carbon steel to hardwood to laminated wood and back again to aluminum as productive capacity for that metal caught up with needs.[18] Although various items of Medical Department supply suffered temporary loss in quality by substitution, the war effort as a whole gained impressive quantities of critical materials (table 1).

TABLE 1.—*Scarce materials saved by Medical Department conservation measures, 1942–43*

Material	Quantity saved (in pounds)		Material	Quantity saved (in pounds)	
	Fiscal year 1942	Fiscal year 1943		Fiscal year 1942	Fiscal year 1943
Aluminum	186, 333	102, 000	Lead	8, 142	0
Antimony	2, 497	150	Manganese	148	0
Brass	148, 482	0	Nickel	199, 358	44, 000
Bronze	275	0	Rubber	372, 787	2, 985, 000
Cadmium	680	7, 000	Silk	6, 455	80, 000
Chromium	339, 152	207, 000	Steel	1, 006, 612	2, 970, 000
Copper	4, 685	777, 500	Tin	263, 320	584, 000
Formica	34, 244	0	Zinc	0	6, 000

SOURCE: Annual Reports, Finance and Supply Services, Fiscal Years 1942 and 1943.

In addition to the conservation measures outlined, the Medical Department sought to relieve the raw materials shortages of its contractors by obtaining high preference ratings from the War Production Board and the Army and Navy Munitions Board. In these endeavors, the Department was confronted by an all-embracing system of raw materials control which, although it was not inflexible, could not often be changed to aid a single technical service (fig. 8).

It was not until 1944, when steel, aluminum, and copper became more abundant, that many of the unsatisfactory substitutes could be abandoned. At that time, the Medical Department launched a program which it described as "reverse conservation." All specifications which had been amended to permit the use of substitute materials were carefully revised, and vigorous requests

[18] (1) See footnotes 15(2), p. 45; and 16(2), p. 46. (2) Annual Report, Finance and Supply Services, OTSG, fiscal year 1942.

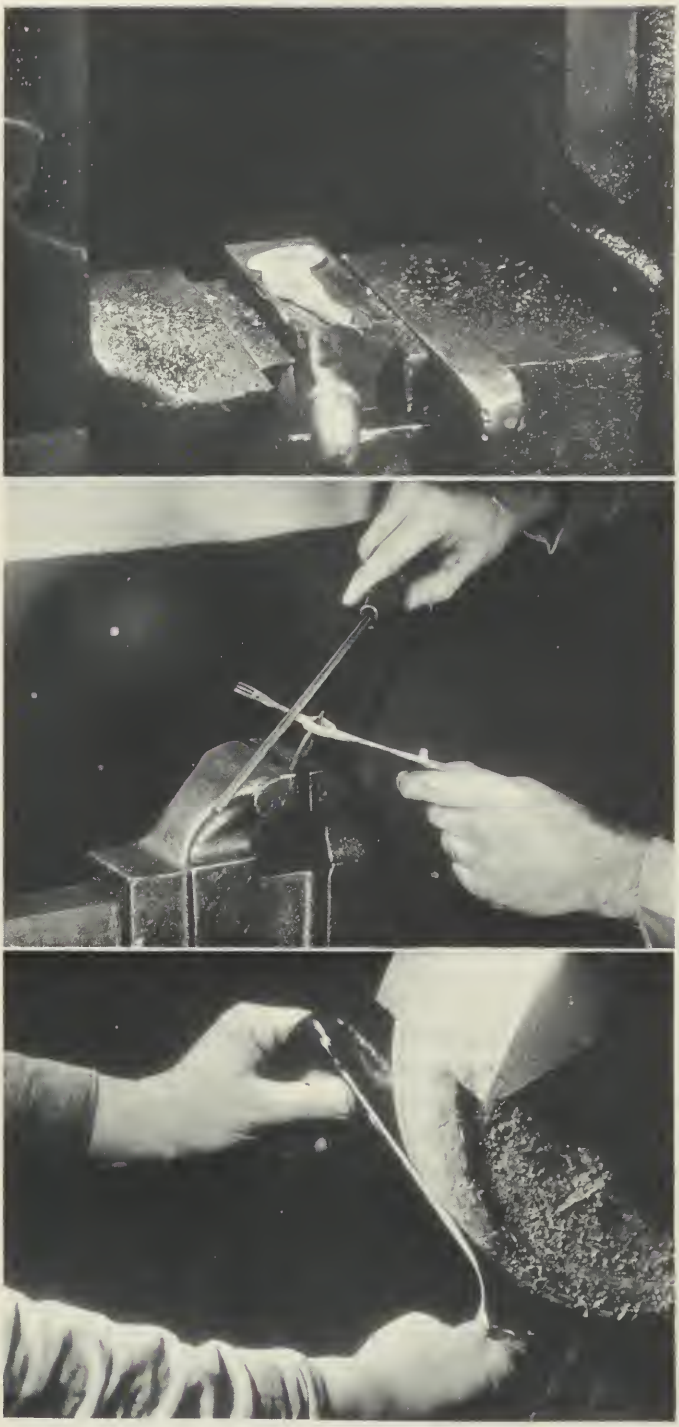

FIGURE 8.—Steps in the production of surgical steel instruments included forging, milling, and a number of skilled benchwork handcraft operations, such as the hand polishing operations depicted. (Photographs, courtesy J. Sklar Manufacturing Co., Long Island, N.Y.)

FIGURE 9.—Litter, Folding, Aluminum, was one of eight different kinds of field litters covered by separate specifications and carried in depot stocks during World War II.

were made for the raw materials of first choice. Within a few months, brass shell sterilizers, aluminum pole litters, and stainless steel bedpans heralded the dawn of a more abundant day (fig. 9).[19]

ALLOCATION OF MATERIALS

The Priorities System

The original priorities system instituted in 1940 by the Army and Navy Munitions Board established preference ratings based on the relative urgency of certain military items. The top priority rating of A–1–a was given to tanks. Airplanes were rated A–1–b, and other items, A–1–c through A–1–h. Medical supplies for the Army during this early period were rated A–1–d. These eight priorities ratings, the only ones in existence in 1940, were issued exclusively to manufacturers by the Army and Navy Munitions Board. The granting of a rating to a manufacturer gave him the right to place that rating on all orders for raw materials and component parts needed to complete the end item. Since this was a small defense program rather than a large war program, no great difficulty was encountered in filling rated orders. The remainder of the country's production was not affected, except for some delays in filling civilian orders.[20]

[19] See footnote 16(2), p. 46.

[20] This section on Allocation of Materials is based primarily on studies made by two procurement officers: (1) Capt. Devon A. Davis, MAC: Advent of New Procedures. Effect of Priorities on Procurement. [Official record.]; and (2) Maj. T. M. Salisbury, MAC: Priorities, Allocations, and Materials Control. [Official record.] Also consulted were the annual reports for the war years of the Supply Service, OTSG, and of the Army Medical Purchasing Office. The definitive study of the subject is Novick, David, Anshen, Melvin, and Truppner, W. C.: Wartime Production Controls. New York: Columbia University Press, 1949.

FIGURE 10.—Manufacturing transformer components for X-ray machines. Cable insert wells are being fabricated on the right; transformer coils, in the center.

The Medical Department prepared a critical and essential item list comprising about 1,000 of its 4,500 cataloged items for blanket coverage. As materials became scarcer, this list soon proved to be too restrictive, and special applications had to be used increasingly. In any event, the mere fact that the contractor had received the contract and his A–1–d preference rating did not mean that he could automatically procure the necessary raw materials. He had no more than a license to buy if and when he found the materials he needed, uncommitted to higher priority orders (fig. 10).

Another administrative handicap developed shortly after the inauguration of a preference rating system. Before its establishment, to exact prompt deliveries, most Medical Department contracts carried a liquidated damage clause affixing a penalty for items not delivered within the time specified. Potential contractors hesitated to accept preference rated contracts or orders carrying a higher preference rating than those they were already processing, if they also contained this liquidated damage clause. To overcome this condition, the Secretary of War issued Procurement Circular No. 36, dated 23 October 1940, so that inclusion of the liquidated damage clause was applied only to exceptional cases or when no conflict was anticipated. Changes also

authorized contracting officers to grant time extensions as warranted by the facts in the case.

At the beginning of 1941, the Office of Production Management was established, and it soon assumed complete priorities control over certain scarce materials. Regulations were issued prohibiting producers from filling civilian orders until all rated orders had been completed. The preference ratings, in addition, were greatly expanded. At the top level, two ratings were added: A–1–i and A–1–k. These were followed by a new level, A–2 through A–10, and a third level which consisted of two ratings, B–1 and B–2. From the very beginning, however, the last two ratings were largely valueless, for the higher ratings got the scarce materials and the factory space. Two methods were used in establishing priority ratings: (1) the "blanket rating" extending a priority for certain kinds of items, thus rendering individual applications unnecessary; and (2) the ratings granted for individual orders or contracts. In January 1942, the WPB (War Production Board) succeeded the Office of Production Management and gradually assumed the priority functions previously exercised by the Army and Navy Munitions Board.

Aside from frequent changes in organization, responsibility, and personnel, the greatest difficulty faced by the Medical Department in dealing with the production agencies was the absence of any organizational group familiar with the needs for health supplies. In dealing directly with the metallurgical group handling brass, for example, the Medical Department manufacturer was apt to have his request for brass for use in sterilizers met with a statement that the request represented so many cartridges. The early establishment of a Health Supply Section in WPB, however, was a recognition of the special nature of health supplies and a guarantee that materials needed for them would not be lightly or ignorantly denied.

The priorities system never attempted to balance the issuance of preference ratings against the available supplies or raw materials. Indeed, the system was an attempt to find a substitute for balancing supply and demand, based on the theory that the relative urgency of different products was accurately reflected in the priorities. It made no difference, therefore, how many preference ratings were issued; when the materials and resources were exhausted, orders with a low rating would not be filled. For example, if enough A–9 or higher ratings were issued to use up the entire available supply, no orders with ratings below A–9 would be filled; and, since all orders of A–9 or higher were more urgent than lower orders, the objective of the system would be accomplished.

This kind of balance was never achieved because of a pronounced lack of uniformity in appraising urgency, and there was insufficient information upon which to base the appraisals. Who, in 1942, could declare with certainty that trench mortars were more important than field X-ray machines? If such a declaration were made in January 1942, who could believe it would remain valid throughout the succeeding months? This lack of faith in preference ratings smoothed the way for a priorities race. When it became obvious that an

A–3 contract could not be filled, there was a tendency to rerate the contract. This, of course, made the plight of low ratings more hopeless than ever. Just after Pearl Harbor, for example, it appeared that the A–10 rating given to manufacturers of medical supplies and equipment was losing its effectiveness. Suppliers, fully occupied with higher ratings, were paying scant attention to A–10 orders. Before long, any rating below A–1, for steel, copper, or other critical materials, became valueless.

An attempt was made to solve this preference rating inflation by adding "superratings"—that is, by more inflation. AA was the first of the new ratings, added in 1941. By the end of the summer of 1942, many manufacturers had their mills booked solidly in advance on nothing but A–1 orders, and it became necessary to add a whole series of superratings, beginning with AAA as the emergency rating and followed by AA–1, AA–2, AA–3, and AA–4. Within a few months, some ratings had become the victim of still further inflation, and it became obvious that priorities alone could not control the flow of scarce materials.

The Medical Department in particular had fared poorly under the priorities system as then established. Its contractors, generally speaking, had received A–1–d preference ratings, while medical supply contractors of the Navy had the advantage of A–1–a ratings. This severe handicap was rendered still more serious by the fact that the Air Corps, Signal Corps, and Ordnance Department had A–1–a ratings for critical materials. This rendered it virtually impossible for Medical Department contractors to make deliveries within reasonable periods of time when critical raw materials were required. This difficulty was partly solved by the conservation measures described earlier, but there were limits beyond which conservation could not be pushed. It became necessary, therefore, to appeal for higher preference ratings on urgently needed items. In some instances, better "blanket" type ratings were assigned. In June 1942, an A–1–a rating was granted for all depot freight handling equipment; at the same time, the Medical Department was authorized to give a rating of A–1–a to 65 percent of its contracts, the estimated percentage of its purchases which were being shipped overseas. This authorization also permitted the use of the A–1–b rating for all metal components not rated A–1–a. This, naturally, was a distinct aid to Medical Department procurement, but it must be remembered that the superratings added in 1941 and 1942 rendered the A–1–a rating far less valuable than formerly.

The Production Requirements Plan

Late in 1942, the priorities system was supplemented by the Production Requirements Plan, which provided that every manufacturer using more than $5,000 worth of certain scarce metals and metallic materials in a 3-month period could obtain those metals only through allotments. An attempt was made to balance those allotments against the available supply by giving a preference rating to be used in obtaining the materials thus allotted.

This plan was short-lived. The theory, while simple, seemed extremely complicated to manufacturers. The plan was not fully operative until 1 October 1942, when it had become generally known that a different plan for controlling the flow of materials was being developed. The fundamental weakness of the system, assuming that it had been given an opportunity to be thoroughly tested, was that the basis of allotting materials was the manufacturers' own statements of what they felt they needed for war production. Only at the top could the needs of the war program be translated into allotments of materials to manufacturers, not from the standpoint of what the manufacturers wanted as permitted under the Production Requirements Plan.

The Controlled Materials Plan

The Production Requirements Plan had scarcely gone into effect before a new and more effective system was devised. Known as CMP (Controlled Materials Plan), this system was first announced in November 1942 and was in full effect by July 1943. Under CMP, three key materials—carbon steel, copper, and aluminum—were allocated among approved programs submitted quarterly by seven claimant agencies, including the War and Navy Departments and WPB's Office of Civilian Supply. Each contractor submitted to the appropriate claimant agency a list of materials needed, with required dates of delivery. When all claims were in, WPB divided the available supply of the three controlled materials among the claimant agencies, which in turn approved deliveries to the contractors. If there were not enough materials to satisfy all claims, some of them were cut back until supply and demand were in balance. Under the priorities system, only those with high ratings got anything at all; under CMP, all approved programs got something although it might be less than requested. Materials other than steel, copper, and aluminum were distributed through the priorities system and by means of conservation orders, but the old difficulties were no longer experienced because the control of the basic materials served as a limiting factor on the use of others.

End items were divided into two groups, called "A" and "B" products. "B" products were those items regularly produced for civilian consumption, commonly called shelf or stock items, such as motors, gages, microscopes, screws, bolts, and refrigerators. "A" products were classified as all end items not listed in the "B" products list, and included items not generally produced in quantity before the war, such as tanks, guns, aircraft, and ships. However, for convenience, "B" items were sometimes treated as "A" products or vice versa with special permission from WPB.

Scheduling production.—Since most Medical Department items fabricated from controlled materials were regularly produced for civilian consumption, they were treated as "B" products. However, a few exceptions, such as X-ray darkroom tents, hospital beds, and gasoline burners, were classified as "A" items. Classifying Medical Department items as "B" products meant that responsibility for obtaining controlled materials requirements and passing

allotments to prime contractors rested with the appropriate industry branch in the Office of Civilian Supply.

The Controlled Materials Plan proved to be far superior to anything previously devised. Medical Department contractors encountered little difficulty in obtaining allotments of controlled materials, especially if orders were placed 60 days before the required delivery date. More difficulty was encountered in obtaining electrical components such as motors, starters, transformers, meters, and high voltage wire; but where great need could be shown, assistance from WPB was obtained to expedite delivery.

Duties of the procurement officer.—Under CMP and the priorities system which accompanied it, Medical Department procurement officers had important duties. It was essential that the required production be scheduled so that items would be delivered when needed, and that scarce materials and restricted manufacturing facilities were not devoted to the production of items until they were needed. Since requirements were never static and since plans for overseas operations were frequently changed, this involved a continuous study and control of production schedules. For example, scarce materials allotted to the production of one item had to be speedily withdrawn when it was discovered that the production of another item had suddenly become more urgent. Procurement officers found that their task, in this respect, resembled that of an engineer who sits in a maze of pipes and opens and closes valves, thus directing the flow of critical materials to the areas that most needed them and restricting the flow to areas of less urgent need. A similar task was accomplished with the priorities system. Each contract which involved the use of scarce materials received a preference rating designed to supply the materials within the time limits allowed by the contract. Frequent adjustments were necessary, however, as the value of preference ratings fluctuated and as the comparative urgency of different production programs varied with the military situation. It was sometimes necessary to apply to WPB for emergency ratings to expedite a contract whose speedy completion had suddenly become urgent.

Adjustment of contracts.—A considerable improvement in the authorized preference ratings facilitated operations and lessened the need for individual pleas to WPB for relief. To counter further inflation of priority ratings, a priorities directive was issued on 15 December 1942 permitting the Medical Department to rate 60 percent of its requirements for each quarter AA–1 and 40 percent AA–2X, figured on the total value of all contracts issued during this period. The procurement office thus determined which contracts were to receive the higher priority. In general, those contracts which covered items involving the more critical production materials or urgently needed items were rated AA–1, while items not urgently needed or involving noncritical materials were rated AA–2X.

The 15 December 1942 priorities directive permitted all contracts involving the purchase of items for Russian Lend-Lease to be rated AA–1, without

being charged against the 60 percent AA–1, 40 percent AA–2X pattern. In addition to buying and shipping direct under the Russian protocol, some items were bought for the American Red Cross to be shipped by that agency to Russia. Four blood plasma processing plants, incorporating the best feature of several of the commercial processors, were examples.

The system put into effect by the December 1942 directive worked smoothly for the Medical Department until the beginning of 1945, when the supply situation began to change. Some materials, notably packing supplies, that could formerly be obtained with an AA–2X rating, required an AA–1 rating. Indeed, many suppliers refused to accept orders; or, if they did accept them, they could offer no assurance that delivery would be made on time because of large backlogs of AA–1 orders. As a result, it was necessary to give the higher rating to contracts previously granted an AA–2X rating; obviously the 60 percent AA–1, 40 percent AA–2X pattern was no longer adequate for Medical Department requirements. Since the 60–40 ratio could not be improved, the alternative was to process through WPB each contract which required rerating, and to study carefully each new contract before rating it, thus seeking to conserve the AA–1 ratings.

This sudden tightening of materials was caused by several factors, the most important probably being the lack of sufficient manpower. In addition, a general relaxation occurred during the last quarter of 1944 when the war in Europe appeared to be nearing its end. Contracts were drastically cut back or canceled, causing mills which produced materials to curtail production. In this situation, Medical Department contractors consumed their inventories and refrained from restocking. When it was discovered that the war in Europe could continue for months, a great procurement rush began. Army and Navy contracts were released calling for the quickest possible delivery, and contractors sought to restore their inventories. This caused the mills and component manufacturers to be flooded with so many orders that 5 to 6 months' delivery time was not unusual. To deal with this situation, production directives and emergency preference ratings were obtained from WPB to speed the completion of the most urgent contracts.

Aid to contractors.—In the meantime, procurement officers of the Medical Department were aiding contractors by extending other types of assistance. Through the Production Service Branch of the Army Medical Purchasing Office, contractors received the aid they required to make prompt deliveries. This aid most frequently took the form of higher preference ratings, but even when these were granted, many problems remained involving delivery of war materials and machinery, component parts, subcontracting service, and the like. These were "trouble spots" existing in contractors' plants.

Fortunately, most production problems did not require detailed and painstaking study for their solution. A telephone call to the manufacturer of a component part, the supplier of raw materials, or a governmental agency was often sufficient to solve a production problem. Sometimes a visit to a plant revealed

a difficulty and rendered its solution possible.[21] What was required in all instances, however, was a system that would keep track of progress and would inform procurement officers of all delays in production. The "Ten-Day Status of Procurement Report," developed early in 1943, served this purpose.

Each buyer was given, every 10 days, a complete résumé on the status of all items for which he was responsible. This gave him a clear basis for forecasting, placing additional contracts, scheduling, and expediting the completion of contracts already placed. Many production difficulties were brought to the attention of the buyer, and thence to the Production Service Branch, through this report. For example, during fiscal year 1945, approximately 50 manufacturing establishments were visited to determine the status of production and to render aid when completion of contracts was delayed.[22]

MANPOWER PROBLEMS

Loss of Skilled Workers

Procurement officers exerted themselves, also, to assist manufacturers with manpower problems, which became increasingly serious as the war progressed. The operation of the Selective Service law had a constantly disruptive effect upon Medical Department contractors, for skilled and semiskilled workers, whose replacement was difficult, were regularly inducted into the Armed Forces (fig. 11). Whenever the induction of a valuable worker was threatened, the contractor informed the procurement office, which immediately sought an occupational deferment for the worker. Contact was made with the local Selective Service Board by telephone, by mail, and, in some instances, by personal visits. The worker's importance to the Medical Department contractor was urged upon the board, and representations were made as to the essentiality of medical supplies. If the request for deferment was rejected by the local board, the case was followed to the appeal board and, if necessary, to the State Selective Service Director. When all these efforts failed, the chief of the labor branch in the appropriate service command was urged to transfer the worker to the Enlisted Reserve Corps so that he could return to his factory and help complete the contract, or at least train a replacement.

Early in the war, selective service officials were reluctant to grant occupational deferments, especially at the lower levels, to the workers of Medical Department contractors, for they understood little of the Department's work and had even less information on the importance of medical supplies. Pressed by the necessity of filling their quotas and sensitive to ill-informed public criticism, the local boards inducted many skilled workers, whose loss delayed the completion of contracts for vitally needed supplies. This difficulty became especially troublesome in 1943, when local boards were "scraping the bottom

[21] Ingraham, N. K., and Hornbacher, Arthur: Production Control, General Difficulty. [Official record.]

[22] Annual Report, Contractors Service Branch to Public Relations Officer, Army Medical Purchasing Office, fiscal year 1945.

FIGURE 11.—Woman operating forklift truck stacking boxes on pallets, St. Louis Medical Depot.

of the barrel" to fill the very heavy quotas demanded in that year. By the latter part of 1943, however, the general public and the local boards were becoming more acquainted with the importance of medical supplies—a development caused largely by radio, newspaper, and magazine advertisements. The attitude of local boards began to change and deferments were granted in greater numbers. From November 1944 to May 1945, approximately 2,500 deferments had been processed, and more than 1,100 deferments were granted.[23]

Labor Disputes

Labor officers also had to deal with strikes and the threat of strikes, and with their normally attendant cause—wage disputes. Strikes were not actually prohibited by law, but the right to strike was first hedged with the threat of public odium, then abridged by what amounted to compulsory arbitration. The National Defense Mediation Board was created by Executive order in

[23] (1) Evans, C. M., and Hornbacher, A.: Manpower. [Official record.] (2) See footnote 22, p. 56.

March 1941. Although this board had no sanction but public opinion and no tool but moral suasion, it made an enviable record in its 10 months of existence. It was succeeded in January 1942 by the National War Labor Board, with authority to "finally determine" labor disputes. The big stick behind the soft words was the war powers of the President, who could and did seize plants in which either labor or management was unwilling to abide by the ruling of the National War Labor Board. The War Labor Disputes Act (Smith-Connally Act) of 25 June 1943 reaffirmed the President's power to take over essential plants in which work had been, or was about to be, interrupted.

No manufacturer holding Medical Department contracts was involved in such action, but the production of surgical and dental instruments had been delayed by strikes before the original mediation board was set up. To minimize such delays in the future, supply contracts by the fall of 1941 included the following paragraph:

"Whenever an actual or potential labor dispute is delaying or threatens to delay the timely performance of this contract, the Contractor will immediately give notice thereof to the Purchasing and Contracting Office. Such notice shall include relevant information with respect to such dispute." [24]

INSPECTION OF MEDICAL SUPPLIES

Before 1943, medical supplies were inspected after purchase in a manner which had been followed for many years. When supplies were received at depots, samples were withdrawn and tested for compliance with specifications. Samples of sterile solutions and products were forwarded to the Food and Drug Administration; other supplies which the depot was unable to test were forwarded to the laboratories of the procurement officers, at either St. Louis, Mo., or New York. Until a favorable report had been received on samples sent away for testing, the stocks from which they were drawn were segregated and made unavailable for issue. This system of inspection was satisfactory during peacetime. The quantities of supplies purchased were small, and they were procured from standard manufacturers who maintained adequate testing laboratories and were well acquainted with Medical Department specifications. No difficulties proceeded from the delay in making supplies available for issue since the depots maintained adequate stocks to meet all current demands. If a shipment of supplies failed to pass the tests, it could easily be replaced in ample time.

As the size of the Army multiplied, the quantities of medical supplies purchased vastly increased. They were procured from a large number of manufacturers, some of whom had only recently converted their factories to war production. These new manufacturers were not thoroughly familiar with Medical Department specifications, and many did not possess adequate test-

[24] The quoted passage is from War Department Supply Contract Form No. 1, 16 Sept. 1941, Article 16.

ing facilities. Rejection of medical supplies led to serious embarrassments, for such rejections resulted in the loss of critical raw materials and the waste of valuable manufacturing space, labor, transportation, and packing supplies. It soon became obvious that the inspection of medical supplies upon delivery, if not accompanied by inspections during the manufacturing process, was a luxury that the Medical Department could ill afford during the war.

In January 1943, an inspection section was established in the New York Medical Department Procurement District. Inspectors who possessed technical training and experience in testing various types of medical supplies were recruited and given still further training. The country was then divided into a number of areas, and the inspectors were assigned to the plants of Medical Department contractors: 33 inspectors entered plants in the Greater New York City area; 18 were assigned to the Middle Atlantic area (including upstate New York, Pennsylvania, Maryland, Ohio, and New Jersey); 9 were assigned to the New England area; and 11 were assigned to the Western area. These plant inspectors served a threefold purpose: (1) to check the contractor's inspection methods, (2) to determine compliance with contract specifications, and (3) to prevent shipment of substandard supplies to the depots.[25]

Occasionally, the inspectors observed inadvertent departures from specifications, which were quickly corrected by grateful contractors. At times, also, the ambiguous wording of some specifications and purchase descriptions led to different interpretations by contractors and inspectors. These were soon settled by reference to chief inspectors and procurement officials. Perhaps the greatest difficulties arose when plant inspectors approved the shipment of urgently needed items which did not conform to all technical requirements of specifications, but which, nevertheless, were usable and suitable for their intended purpose. Those departures from specifications confused depot inspectors, who, although they had been informed of the new policy, returned a number of shipments on the grounds that they were too much at variance with specifications. This friction and disagreement were especially important in regard to substandard surgical instruments. At length, a conference in New York, attended by both plant and depot inspectors, established a procedure which satisfied all. After June 1943, when depot inspectors refused to accept a shipment approved by plant inspectors, the commanding officer of the Army Medical Purchasing Office received reports from both inspectors and rendered a binding decision.

The system of plant inspections appears to have been an unqualified success. In 1943, approximately 800 plants located in 29 states were served by the inspectors; by the following year, the number of plants increased to more than a thousand. The cost of the inspection was very modest—.103 percent of the cost of supplies shipped in 1943, and .157 percent in 1944.

It has been indicated that the plant inspections supplemented rather than replaced the final inspections at the receiving depots. It should be made clear,

[25] Pigott, John W., and Hornbacher, Arthur: Inspection. [Official record.]

also, that employment of the testing laboratories of the Food and Drug Administration and the Army Medical Purchasing Office continued throughout the war. In fact, the laboratory of the procurement office, transferred from Binghamton, N. Y., to New York in February 1943, was enlarged and equipped to perform examinations for both inspection and the development of specifications. In fiscal year 1944, 5,429 formal examinations were performed by this laboratory; in fiscal year 1945, the number was increased to 5,572.[26]

CONTRACT TERMINATION

In the fall of 1943 when it became apparent that there was to be a large volume of contract terminations, the Legal Section undertook the development of procedures and policies for processing them. Contract modifications were a trivial source of potential unpleasantness in comparison with terminations, and this wholly aside from the work devolving upon contractors and purchasing officers alike. In time and labor, termination of contracts frequently exceeded the initial contracting effort tenfold.

Terminations continued all during the war, and cancellations at the war's end were anticipated, but it is questionable that anyone foresaw their magnitude. Every contract for more than $1,000 written by the Medical Department during the war contained a clause providing that the Government could cancel the contract at its option and, in that event, would pay the contractor on a fair and equitable basis for costs incurred. Until September 1943, terminations were on a relatively small scale, totaling approximately $22.5 million, and were handled by the legal staff. Most cancellations stemmed from the substitution of newly developed items for obsolete items.

In September 1943, terminations had become so extensive that a Contract Termination Branch became a part of the Army Medical Purchasing Office. Because of cutbacks in requirements on all classes of medical supplies, two large waves of terminations occurred in September 1943 and February 1944 amounting to approximately $42.5 million.

It was recognized that the end of the war would automatically cancel the need for much of the material under contract; the date, of course, was unpredictable. In July 1944, Congress turned its attention to this matter and, to safeguard the economic welfare of the Nation, passed the Contract Settlement Act of 1944, establishing as primary objectives: (1) settling of terminations claims fairly and quickly; (2) prompt clearance of termination inventory from war plants; and (3) provision of adequate interim financing for war contractors pending settlements.

Training meetings were held in New York in June 1944 and in Chicago in August 1944, with large numbers of medical contractors in attendance. In the Army Medical Purchasing Office, too, preparations moved apace to meet this anticipated workload, including augmentation of the staff by additional

[26] (1) Annual Report, Procurement Division, New York Medical Depot, fiscal year 1943. (2) Annual Report, Material Standards Division, Army Medical Purchasing Office, fiscal year 1945.

accountants as well as plans for transferring personnel from the buying branches to the Termination Branch on V–E Day.

Other preparations were occurring simultaneously to minimize the termination problem. In late 1944, as stocks accumulated and the War Department became optimistic about an early conclusion of the war in Europe, procurement shifted from long-term to short-term contracts. Close attention was paid to estimated future requirements. As a result of this policy, it was necessary to terminate only $11 million in contracts after V–E Day. When hostilities ceased in the Pacific, the entire procurement program was cut back according to plan and more than $54 million of Medical Department contracts were canceled within 24 hours. For the entire war period, approximately 4,000 different contracts involving $110 million in canceled contracts were processed and settled. Of this amount, $50 million was settled without cost to the Government.[27]

One of the more difficult problems of contract termination was disposition of items already completed but not yet delivered. It was at first determined that an attempt should be made to have the contractor keep these items at a fair valuation. Otherwise, an attempt would be made to dispose of them to foreign governments or to such organizations as the Russian War Relief and United Czechoslovakia Relief. Failing in these steps, the supplies were then to be shipped to depot stocks. Subsequently, The Surgeon General directed that all sales to the United Nations, including Russian War Relief, should be handled directly through the International Aid Division. A bulletin of completed items in the hands of contractors was prepared and distributed to business firms, relief societies, and other agencies. Considerable quantities of surgical instruments were sold to the U.S. Navy Department, and articles like kit pouches were sold to the Boy Scouts of America. Whenever practicable, the contractor would make the sale, using the proceeds to reduce his termination claim. The whole problem was bound up with the larger problem of depot surplus. Contractors and potential purchasers hesitated to retain or buy terminated supplies when the threat of disposition of huge depot surpluses loomed.

Disposal of unfinished supplies also involved many difficult problems. Frequently, unfinished items such as surgical instruments had no value other than their scrap value. When critical material was obtained under the priorities system for filling military orders, contractors could not use it for making items for civilian consumption. To clear up this dilemma, a ruling was obtained permitting contractors to use priority material for manufacture of end items of the same type, even though these new items would ultimately be sold for civilian consumption. If V–Loans were involved or if proceeds of the contract were assigned to some bank, other complications naturally ensued.

Packing and packaging materials were in constantly short supply. When contracts were canceled, the packing materials thus made available were quickly redistributed among those contractors who, because of lack of these

[27] Termination of Contracts in the Medical Department. Bull. U.S. Army M. Dept. 6: 683–686, December 1946.

materials, were delayed in completing their contracts. Transactions like these, of course, necessitated an abundance of financial adjusting.

From the foregoing, it can be readily seen that terminations were time-consuming operations fraught with the possibility of bad public relations. The Medical Department settled all terminations incidental to the war without a single contractor's resorting to the contract appeal or dispute machinery of the War Department, nor was any case invalidated or suspended. Furthermore, 99 percent of these cases were settled within established time limits.

CHAPTER III

Procurement of Problem Items

Procurement of medical supplies in time of war, as discussed in chapter II, was a complex, ever-changing, and frustrating duty. Among the many different articles needed desperately by the Medical Department, several were called "problem items" because of their great importance, the difficulty of obtaining them, and the large size of the requirement. Surgical dressings, blood plasma, penicillin, spectacles, and surgical instruments headed the list of these special problems.

SURGICAL DRESSINGS

The surgical dressings procured by the Medical Department consisted of approximately 75 items, including bandages, absorbent cotton, gauze, surgical masks, abdominal packs, adhesive plaster, pads, plaster of paris, first aid dressings, and surgical sponges. With the exception of the first aid packets and a few other special-type dressings, all these items were manufactured in large quantities for civilian use before 1939. Consequently, no difficulty was anticipated in obtaining most of them from the usual commercial channels in the event of war. During World War I, the local chapters of the American Red Cross had prepared enormous quantities of bandages, dressings, and sponges for the Medical Department; but supply officers, as late as 1939, thought that such outside aid would no longer be necessary, unless for psychological reasons.

Procurement Problems

This complacency was rudely jolted in the spring of 1940 when industry spokesmen made it clear that their plant capacity was insufficient for wartime military needs, and that any large increase in capacity would be impractical. The alternative was for the Army to purchase the appropriate material in bolt form and make its own dressings. The Medical Department abruptly dropped its procurement plans and appealed to the Red Cross for aid. "Since it has been definitely established," The Surgeon General wrote, "that machine-made dressings can be produced in quantity only sufficient for peace-time needs, it is the studied opinion of this office * * * that in time of emergency full and complete reliance must be had upon the good offices of the Red Cross to furnish ready-made dressings." [1]

[1] (1) Letter, Louis H. Nichols, Manager, Hospital Sales, Lewis Manufacturing Co., to George Smith, Director of Purchasing, American Red Cross, 29 Apr. 1940. (2) Letter, Maj. Gen. James C. Magee, The Surgeon General, to Col. James D. Fife, American Red Cross, 20 June 1940.

After receiving assurances that the Red Cross would extend its aid as in the First World War, the Surgeon General's Office requested and received authority "to enter into an agreement with the American Red Cross whereby the Medical Department of the United States Army may procure the requisite materials which will be turned over to the American Red Cross and receive in exchange the equivalent in prepared dressings." These dressings were to constitute "an essential war reserve." [2]

Local chapters of the Red Cross quickly prepared to enlist the women of America in this vital activity. Gauze was purchased from surgical dressing manufacturers, cut into rectangles or squares of the proper size, and shipped to Red Cross chapters throughout the country where volunteer workers processed the material into surgical sponges, surgical masks, and abdominal pads. These supplies were sent to medical depots to be stored until they were shipped overseas or to Zone of Interior installations. Immediately before use, they were sterilized in the central supply rooms of the hospitals to which they were issued.

From August 1942 to the end of 1944, a total of nearly 300 million yards of gauze was purchased by the Medical Department and sent to the Red Cross chapters. From this gauze, it was estimated that approximately 5 billion sponges, masks, and pads were prepared. During the winter and spring of 1945, production of these supplies continued at such a rate that, by April 1945, sufficient stocks had been built up to warrant the gradual closing of the workrooms, and in July of that year, production ceased altogether.[3]

It should not be assumed, however, that the aid extended by the Red Cross, valuable as it was, solved all problems involved in the procurement of surgical dressings. Labor shortages and the lack of adequate plant capacity threatened to restrict production of dressings not prepared by the Red Cross to a quantity far below anticipated requirements. Foreseeing this difficulty, procurement officers of the Medical Section, New York General Depot, New York, N.Y., called a meeting in August 1940 which was attended by representatives of all known manufacturers of surgical dressings. These representatives were informed of the procurement program, the mounting requirements in each item, and the necessity for speedy deliveries. They were told that the quantities required would be allocated to the several manufacturers on the basis of delivery time, price, and the production capacity of each firm. In accordance with these terms, bids were submitted, delivery schedules established, and contracts negotiated. The manufacturers were warned, however, that requirements were constantly increasing, and that only through an expan-

[2] (1) Letter, Col. James E. Baylis, MC, to The Adjutant General, 6 Aug. 1940, subject: Surgical Dressings. (2) Letter, Lt. Col. F. C. Tyng, MC, to American Red Cross, attention: Mr. DeWitt Smith, 4 Sept. 1940.

[3] (1) Memorandum, Maj. C. E. G. Reeves, MAC, to the Historical Division, 23 Oct. 1944, subject: American Red Cross Surgical Dressings Program. (2) Annual Report, Liaison Branch, Purchases Division, Supply Service, OTSG, fiscal year 1945.

sion of plant capacity could the necessary production be attained. Help was promised in obtaining new tools, equipment, and labor.[4]

The requirements for surgical dressings were greatly augmented by entry of the United States into the war. In addition, lend-lease requirements and the large quantities of gauze purchased for the Red Cross placed heavy burdens upon an industry ill-equipped to bear them. There was not enough factory space, not enough looms, not enough workers, not enough bleachery capacity. In some instances, there was probably also insufficient incentive on the part of the manufacturers to produce the "gray goods" out of which surgical dressings were made, for the available looms could be far more profitably employed in weaving higher priced material. Manufacturing capacity was increased by the enlargement of factories and the addition of new equipment, usually aided by certificates of necessity providing rapid tax amortization, and by the construction with Defense Plant Corp. funds of a new factory in Greenville, S. C. Known as Convenience, Inc., the new plant produced exclusively for the Medical Department until the latter part of 1944, when a sufficient quantity of most surgical dressings had been procured.

Camouflage Dressings

Procurement of some items of surgical dressings was attended with considerable and peculiar difficulties, which deserve a more detailed treatment. The production of camouflage dressings, for example, created problems which could not be solved routinely. By the summer of 1943, it had been well established that white surgical dressings in the Pacific theaters were attracting the attention of Japanese snipers and pilots. The decision was made, therefore, to dye in "field brown" all field dressings used in the Pacific theaters, and in July 1943, instructions were issued to that effect. This decision presented a number of problems to the Supply Service and its contractors, including the toxicity of the dyes, effect on the absorbency of the gauze, the industry's ability to convert to dyed dressings, and the productive capacity of dyers and finishers. Outstanding contracts for several items of white dressings were modified, and work on the field brown dressings was started in September 1943. After several experiments, a nontoxic dye which had only slight effect on the absorbency of the gauze was produced. By November 1943, more than 13 million individual dyed dressings had been delivered to the depots. Throughout the remainder of the war, adhesive compresses, 2-inch and 4-inch gauze compresses, compressed bandages, small first aid dressings, large first aid dressings, first aid packets, and triangular bandages were supplied either in field brown or in olive drab No. 7.[5]

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[4] Hornbacher, Arthur: Negotiations—Surgical Dressings. [Official record.]

[5] Davis, Lewis W.: Development of Field Brown (Camouflaged) Surgical Dressings. [Official record.] The British had been confronted with the same problem during World War I when they developed a khaki bandage for field use. It appears, however, that officers of the Supply Service were unacquainted with the British experience and so derived no profit from it. *See* MacPherson, Maj. Gen. Sir William G.: History of the Great War. Medical Services General History. London: His Majesty's Stationery Office, 1921, Vol. I, p. 168.

Petrolatum Dressings

Another production problem was the petrolatum dressing, developed late in the war. This dressing, consisting of a gauze bandage impregnated with petrolatum, permitted the application of sterile petrolatum to a burned surface and thus was a significant medical advance in a war which, more than any previous one, produced many serious and painful burns. Two technical difficulties confronted the sole supplier of this item—the development of a technique to produce a sterile dressing, and the manufacture of a greaseproof package which would withstand high sterilization temperatures. Considerable delay was experienced, also, in building the new plant necessary for the production of this item. The petrolatum and the gauze bandage were sterilized separately and were then brought together under sterile conditions. The envelope for the individual dressing was a lamination of Vinylite and aluminum foil, which was heat-sealed after the bandage was impregnated with the sterile petrolatum. Three of these dressings were then packaged in a Reynolds Metals envelope. The first shipment, consisting of 6,000 dressings, was delivered to the Kansas City Medical Depot, Kansas City, Kans., early in June 1945.[6]

First Aid Packets

The difficulties involved in the procurement of the first aid packet were more important and continued longer than for the petrolatum dressing. This packet contained a small, sterile dressing and was carried by each soldier in a pouch attached to his belt. Approximately 8 million were required for initial equipment, and the replacement rate was 60 per thousand men per month in the Zone of Interior and 220 per thousand in the overseas theaters.

A contract had been signed with the two suppliers in 1940 calling for the production of 2 million first aid packets, but it was estimated that delivery would not be completed until March 1942. Brass sheeting, needed to manufacture the metal case which enclosed the dressing, could not be obtained in sufficient quantities. To solve this material shortage, copper was substituted for brass in contracts negotiated after March 1941, but, by the end of the year, copper was no more available than brass. Steel was then substituted and two additional suppliers were obtained who were prevailed upon to provide themselves with dies. Shortly after contracts had been made with these two firms, however, the War Production Board refused to allocate any more steel for the first aid packet. During the early part of 1943, with production steadily falling behind requirements, a plastic container was developed and put into production, but under field conditions the package warped and broke open. The Medical Department then worked out new specifications calling for a laminated paper and lead foil bag. The new container passed every test applied by the medical equipment laboratory at Carlisle Barracks, Pa., proving in use

[6] Annual Report, Buying Branch No. 2, Army Medical Purchasing Office, 1945.

to be more satisfactory than even the original brass container. It was, moreover, less expensive to manufacture.[7]

BLOOD PLASMA

Although the manufacture of dried blood plasma antedates World War II, this product received such an impetus from wartime needs that it had many characteristics of a new item. So far as the U.S. Army was concerned, the procurement of blood plasma began in February 1941, when a small shipment was received from Sharp and Dohme, Inc., owners of the patent for processing human blood into dried plasma.[8] Small additional amounts were procured during the remainder of 1941, but it was not until after the attack upon Pearl Harbor that a large-scale procurement program was launched. Blood plasma was administered to many casualties in that attack, and the beneficial results obtained in the treatment of shock, burns, and other conditions associated with the loss of blood and tissue fluids convinced medical officers that this blood substitute was imperatively demanded.

Through the cooperation of the Army, Navy, National Research Council, American Red Cross, and commercial biological manufacturers, a procurement program was instituted for the production of not less than 700,000 units of dried plasma for the Army.[9] By 1943, the Red Cross had organized 33 bleeding centers and was receiving blood donations from the public at a rate of 90,000 per week. Through the efforts of the Medical Department, the patents owned by Sharp and Dohme were made available to eight other commercial laboratories without the payment of royalties. The blood obtained from the public was immediately placed in special containers, where it was kept cool by Dry Ice en route to the processors. The "bleeding" program was so planned that each processor was supplied with all the blood necessary to operate at maximum capacity.

The processing plants received the blood, put it through an intricate manufacturing process, tested the product, and shipped the units of dried plasma to medical depots in all parts of the country. The problems involved in production were numerous and important. Each laboratory had to construct special buildings for the project or convert existing structures; and had to provide itself with many items of new equipment, including refrigerating units, centrifuges, freezing units, drying units, distilling apparatus, sterilizers, and testing equipment. Emergency preference ratings were obtained to expedite production and delivery of this equipment, and, throughout the war, the Medical Department extended its aid in obtaining for the contractors such supplies

[7] (1) Memorandum, Lt. Col. F. C. Tyng, MC, to The Adjutant General, 10 Dec. 1940. (2) Memorandum, Lt. Col. C. F. Shook, MC, to Col. John B. Huggins, MC, Army-Navy Munitions Board, 18 Mar. 1941, subject: Purchases Under the 1941 Appropriation Act. (3) Annual Report, Supply Service, OTSG, 1943. (4) Davis, Lewis W.: Production and Packaging Problems. [Official record.] The inclusion in 1943 of sulfa drugs in the first aid packet caused some technical difficulties in manufacturing, but they were soon overcome.

[8] Annual Report, Renegotiation Division, OTSG, 1944.

[9] Annual Report, OTSG, fiscal year 1942, p. 27. A portion of the dried plasma was supplied to the Navy, and the Navy procured dried human albumin for the Army.

as bottles, rubber stoppers, rubber tubing, needles, filters, tin cans, waterproof packing materials, clamps, cartons, and shipping cases.

SURGICAL INSTRUMENTS

No problem in medical supplies had caused the prewar planners more concern than the procurement of surgical instruments. From 1922 until procurement planning faded into wartime procurement in 1941, it had been clearly realized that the great quantities of surgical instruments needed could be obtained only with marked difficulty. The main outlines of the problem were deceptively simple. Before 1939, approximately 85 percent of all surgical instruments had been imported from abroad, mainly from Germany. When the British blockade cut off German exports in September 1939, civilian and military users of surgical instruments were forced to turn to the manufacturing resources of the United States, which were equipped to supply only 15 percent of the normal peacetime demand. Even had this country remained at peace and made no preparations for war, the situation would have been serious. As it was, the very event which stopped the importation of surgical instruments—the outbreak of the war in Europe—led to an increase in the Armed Forces of the United States and, in consequence, to an augmented military demand for surgical instruments. The small quantities on hand which were held by importers and dealers soon passed through regular trade channels to ultimate consumers, and within a few months, the supply of instruments was critically low.

Fortunately, a movement was already afoot, even before the outbreak of the war in Europe, to increase the productive capacity of American surgical instrument manufacturers. Some American surgeons who were incensed by the Nazis' treatment of the Jews refused to use German-made instruments and purchased those of American manufacture, despite their higher cost. This provided the first real impetus for domestic manufacturers since World War I. The industry was expanded still further in 1940 and 1941, when the operation of the Selective Service Act, induction of the National Guard, and calling up of Reserves added new increments to the Army, producing still higher requirements for surgical instruments.[10]

Thus, when Japanese bombs at Pearl Harbor plunged the United States into the war, the Medical Department of the Army had already provided itself with expanded facilities. The next 6 months, however, comprised a hectic period in the Supply Service and one which was not conducive to speedy and orderly procurement procedures. The office was greatly expanded in personnel, but space continued to be so limited that efficient work was nearly impossible.

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[10] Shea, Elmer A.: History of the Participation of the Surgical Section of Purchasing Branch 2, A.M.P.O., in the Medical Department Procurement Program. [Official record.] This document has been used as a source throughout this section. During the prewar period, there was an *ad valorem* duty of approximately 55 percent on imported surgical instruments. In spite of this duty, importers could still sell foreign instruments at prices lower than those charged for the American product.

An inadequate and outmoded system of calculating requirements, aggravated by the paucity of "due-in" data, made it difficult to determine the quantities needed. The Supply Service, therefore, did not authorize any large-scale procurement of surgical instruments until August 1942. Over the next 3 months, the New York General Depot received requisitions for huge quantities of surgical instruments—quantities so large that purchasing officers and industry officials alike were baffled. After changing specifications for some obsolete patterns, contracts were nevertheless negotiated for the bulk of the requisitions.[11]

Although bids were solicited, the main emphasis was placed upon delivery time rather than low bids. Low-cost producers were paid less, and high-cost producers were paid more. The renegotiation of contracts was expected to capture excessive profits when high-cost producers overestimated their expenses. Thus, all parts of the industry which could produce acceptable surgical instruments were given Government contracts. Later, a cost analysis on all contracts for more than $10,000 was required, but in the summer and fall of 1942, this would not have been practicable. During this rush period, the entire program would have been imperiled if cost figures had been demanded. Indeed, as late as October 1944, the country's largest manufacturer of surgical instruments declared that he was still unable to furnish, in advance, reliable cost statistics.

In accordance with procurement plans prepared in the 1920's, several silverware manufacturers partially converted their plants to the fabrication of surgical instruments. By the end of 1941, five of these manufacturers had received contracts for many thousands of forceps, and, during the heavy procurement of 1942 and 1943, additional contracts were negotiated. Difficult problems developed. Experience in manufacturing surgical instruments was, of course, totally lacking. The necessary machine tools were not readily available. Workers did not possess the requisite skills. Through the cooperation of standard instrument manufacturers, these problems were solved. Skilled craftsmen were loaned to the new manufacturers to train the workers, supervise production, and establish assembly line techniques. In many ways, the standard manufacturers placed their experience and technical resources at the disposal of the erstwhile silverware makers.

The first instruments produced by the new plants did not always meet the specifications, but within a few months, the newcomers were making an acceptable product. By concentrating their energies on a few relatively simple patterns which were needed in great quantities, they ably supplemented the efforts of the regular manufacturers, making it possible for the Medical Department to satisfy its huge requirements for these items.

The lack of an approved line of samples was another obstacle to the rapid completion of the contracts, and was partly responsible for the delivery of some substandard instruments. Representatives of contractors visited medical

[11] Recollections of Col. Paul I. Robinson, MC, conveyed to Capt. Richard E. Yates, MAC, January 1946. The heaviest buying in World War I occurred in the period 1 July–11 Nov. 1918—16 months after the declaration of war.

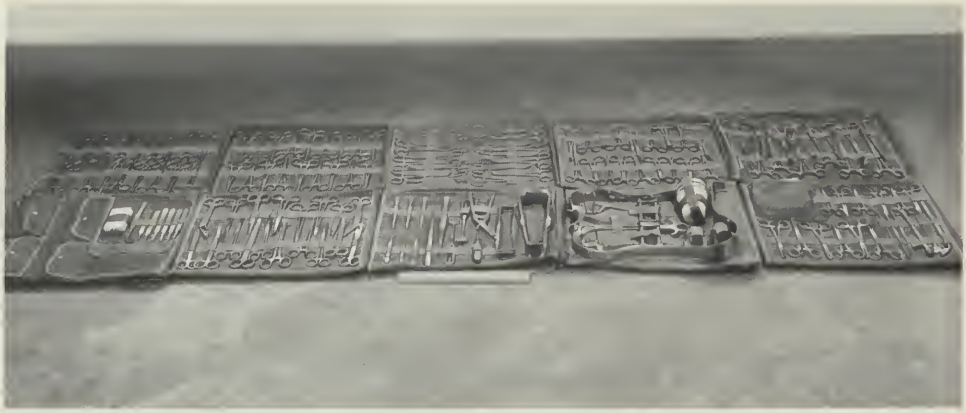

FIGURE 12.—Samples of surgical instruments.

depots and searched the open markets to see the patterns they had been engaged to produce. Some of them later reported that they were shown samples of Japanese instruments from World War I. Finally, in the early part of 1944, a sampleroom was established at the Army Medical Purchasing Office, New York, where a display of all acceptable patterns was maintained (fig. 12).

Inadequate specifications on newer type instruments constituted another difficulty. For a number of instruments, none had been written; and when specifications were available, they frequently afforded meager data. In 1944, a program was inaugurated to bring all specifications up to date and to include specific dimensions as well as drawings.

These problems delayed production and detracted somewhat from the quality of the finished product, but the tremendous program launched in the fall of 1942 was successfully completed. Estimated deliveries of surgical instruments amounted to $25 million in 1943 and $15.5 million in 1944. In some instances, patterns were too far below the standard to be acceptable; in others, instruments that were satisfactory for their intended purpose were accepted even though they did not meet the specifications. There were a few complaints from the field, but most of these related to instruments which had been produced during World War I.[12]

By the spring of 1943, there was reason to believe that the incoming supply of surgical instruments was badly balanced, that many types of forceps, for example, were in "short supply," and that a surplus of other instruments was being piled up. A stock survey was promptly made which definitely proved that the patterns were ill-balanced. Drastic cutbacks were made in some contracts, and quantities were increased in others. By the end of September 1944, surpluses were fast disappearing, and additional orders were placed for many items which had been canceled in 1943.

[12] Annual Report, Army Medical Purchasing Office, fiscal year 1944.

PENICILLIN

No new item of medical supplies attracted as much attention, or grew so rapidly in importance, as did penicillin. Widely hailed as a "miracle drug" in magazines and newspapers, this curative agent was first used in the Army early in 1943, when small quantities were obtained for experimental purposes. Within a few months, it was produced in tremendous quantities and was made available to Army installations all over the world. In no other drug was the gap between experimentation and widespread use bridged with such amazing speed.

The Army program of penicillin experimentation began at Bushnell General Hospital, Brigham City, Utah, in April 1943. In June of the same year, studies were started at Halloran General Hospital, Staten Island, N. Y. The supply of the drug was still so limited, however, that it was doled out with the strictest economy and solely to ascertain its usefulness, to determine its indications and contraindications, and to standardize therapeutic procedures associated with its use.[13] In the meantime, penicillin was first purchased in May 1943, when two contracts were placed for 1,200 vials, each containing 100,000 Oxford units. These were special experimental contracts, for the manufacturing processes were so unsettled at the time, and the purity and potency of the product were so uncertain, that the standard contract forms did not apply. In July, contracts were placed with seven commercial laboratories, also on an experimental basis. Close contact was maintained with the suppliers, and many types of aid were extended to them while they assembled the plant facilities, materials, and labor required for production. During the summer and early fall of 1943, sufficient quantities of the drug were procured to continue the experiments in Army hospitals, to determine its effectiveness, and to supply a small portion of the current needs. This period of experimental manufacture and procurement was also invaluable in providing a wealth of experience in production and packaging techniques. The period of experimental purchase ended on 1 October 1943 when standard Army contracts were awarded to eight contractors.[14]

This marked the beginning of the real "penicillin program" which engrossed the efforts of many purchasing officers and which was granted the highest priority accorded to any military item except the atomic bomb. Nearly every piece of equipment needed to expand production was scarce, including stainless steel piping and tanks, centrifuges, vacuum pumps, and refrigeration equipment. Building material for new production was difficult to obtain. The necessary labor in the "tight labor areas" created serious problems. In these

[13] Annual Report of The Surgeon General of the Army for the Commanding General, Army Service Forces, fiscal year 1944.

[14] (1) Memorandum, Lt. Col. Robert J. Carpenter, MC, Executive Officer, OTSG, to Commanding General, Army Service Forces, 11 Oct. 1944, subject: Checklist for Reports by Government Agencies on Technical Research and Development Work. (2) Memorandum, Lt. Col. Roger G. Prentiss, Jr., MC, Chief, Research Coordination Branch, Operations Service, OTSG, to Director, Procurement Division, Supply Service, OTSG, 19 Aug. 1943, subject: Penicillin Procurement and Delivery Schedule for September 1943.

difficulties, the Medical Department rendered all types of effective aid within its power. Quite naturally, however, the most critical problems—production, testing, and packaging—could be solved only by the efforts of the contractors themselves.

At first, the "surface culture" method of production was universally employed, but late in 1943, experiments with the "deep vat method," similar to a process employed by brewers and probably suggested by that industry, proved successful. Most contractors made the changes in equipment necessary to use this improved technique, which resulted in a far greater production. The problem of packaging was serious. Since penicillin was administered by injection, it was necessary to produce and package it under sterile conditions. In the new plants, the walls were constructed of glass so they could easily be scrubbed with an antiseptic solution. Ultraviolet lamps were used to kill microbes in the atmosphere, for germ-free air was required. The rooms were under a slight pressure so that sterile air would leak out and contaminated air would not leak in. Finally, all workers in the packaging rooms took many precautions that a surgeon takes in the operating room, such as scrubdowns and sterile clothing.[15]

One of the greatest handicaps in the beginning was the refusal of the Food and Drug Administration to approve penicillin in rubber-capped vials, for sufficient experience had not accumulated to determine that the product would maintain its potency and sterility in this type of container. For many months, therefore, it was necessary for the manufacturer to package penicillin in sealed glass vials. Early in 1944, the rubber-capped vial was accepted, and it greatly speeded production. Another improvement, which came in 1945 and which appreciably lessened packaging problems, was the change to the 200,000 Oxford-unit vial. This vial, although the same size and sealed in the same manner, held twice as much penicillin powder and reduced packaging time and materials by virtually 50 percent.

As the manufacture of penicillin progressed, improvements were made in the product itself. Originally, the product contained less than 20 units per milligram; by 1945, the drug contained nearly 1,000 units per milligram. The absolutely pure product, a white crystalline powder, would contain about 1,666 units per milligram. Early in 1943, all penicillin was given a "dating period" of 3 months; later in the year, this period was increased to 6 months; in 1944, it was placed at 9 months; and in 1945, seven producers were furnishing penicillin with a dating period of 18 months. These increased dating periods were a great advantage, for they made packaging problems less acute, and they permitted shipment of the product to distant theaters of war.[16]

The proper distribution of penicillin required the shortest possible time lapse between date of manufacture and date of actual use. It was impracti-

[15] Address, Brig. Gen. Edward Reynolds to Medical Department officers assembled at Walter Reed General Hospital, 19 Sept. 1945, subject: Medical Supply Problems of World War II. [Official record.]

[16] (1) See footnotes 3(2), p. 64; and 15, above. (2) Hornbacher, Arthur: Production Problem: Penicillin. [Official record.]

cable, therefore, for the depots and camps to carry stocks of the item. Penicillin was shipped by the manufacturers to the Kansas City Medical Depot; from there, it was given automatic and immediate distribution to the various theaters of operations and to Army hospitals within the United States. The Surgeon General's Penicillin Board was established to divide the drug among the various theaters and Zone of Interior installations needing it; monthly meetings were held for this purpose.

Until May 1945, penicillin production was rigidly controlled and allocated by the War Production Board. Each month, the Medical Department received its allocation, the remainder of the product going to the Navy and to civilian hospitals. In July 1943, the Medical Department received 4,290 vials of penicillin. The quantity each month slowly climbed until it reached 52,729 vials in December 1943. It was in 1944 that real quantity production began. Receipts climbed from 75,700 vials in January to 200,000 in April, to 1,628,000 in October, and to 1.9 million in December. Steady, but less spectacular, increases continued during the first 3 months of 1945, the March receipts being approximately 2 million vials. Substantially the same quantity was received each month until August, when the end of hostilities led to sizable contract cancellations. During the 2-year period from June 1943 to June 1945, a reduction in price approximated 97 percent of the original price—the most remarkable price decline of any item procured by the Medical Department.[17]

ATABRINE

So far as medical supplies are concerned, the most important effect of the early Japanese successes in the Far East was the loss of the Dutch East Indies. With a few sharp military strokes early in 1942, the Japanese monopolized 90 percent of the world's supply of quinine. Even if the United States had remained at peace, this would have been a serious development, for quinine was used in great quantities to treat malaria in the Southern States. Since it was virtually certain that long campaigns would be fought in the most malarious part of the world—the South Pacific—the problem attained grave proportions. Stockpiles of quinine held by the United States and her allies were low, and there was no reasonable hope that they could be appreciably increased. The growing of cinchona trees in South America was promising as a long-range project; but, since the process required 10 years, it offered no hope of immediate relief.

A synthetic substitute for quinine which could be produced quickly and in large quantities was vitally needed. Such a drug had been developed by German scientists. With the use of that drug—Atabrine (quinacrine hydrochloride)—American soldiers were able to wage successful campaigns against Germany and her allies in the Pacific and in North Africa, Sicily, and Italy.

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[17] (1) See footnote 15, p. 72. (2) Annual Report, Buying Branch No. 1, Army Medical Purchasing Office, fiscal year 1945.

American experience with this drug was not advanced in 1942, but a substantial beginning had been made. In 1931, the Winthrop Chemical Co. started the clinical investigation of Atabrine in the United States. One year later, the commercial synthesis was begun by a process for which some intermediate chemicals had to be imported. Under these circumstances, Winthrop's production between 1933 and 1940 averaged 5 million tablets per year; which was sufficient to satisfy peacetime demands.

In September 1939, the chemical staff of the Winthrop Co. initiated a research program designed to free the United States completely from dependence on foreign sources. The chemists found that a raw material obtainable in the United States could be converted, by two processing steps, into the intermediate which formerly had been imported. At the same time, procedures were developed for synthesizing the side-chain intermediates from domestic materials. All eight individual steps in the complete Atabrine synthesis were perfected on a laboratory scale within a few months. In March 1940, construction was begun on a plant for the production of Atabrine from American materials; in September, the first factory batches of intermediates were produced; in October, the first Atabrine of entirely domestic origin was manufactured. By the end of 1941, the annual production rate was 160 million tablets. During this year, moreover, additional equipment was installed to increase the annual capacity to 227 million tablets—a quantity which, then, was considered sufficient to treat 15 million cases of malaria.

In the meantime, the Medical Department, the Air Surgeon, and the National Research Council were experimenting to determine the usefulness and toxicity of Atabrine. Although the test results were favorable, less than 9 million tablets were purchased for military purposes before 30 March 1942. By that time, a stockpile of approximately 35 million tablets had been accumulated by the Winthrop Co., and the stockpile was constantly increasing for production was steadily rising.[18]

During 1942, Army requirements for Atabrine increased tremendously, but the expansion of the Winthrop plant enabled that firm to fill all orders. A total of 146,987,300 tablets was procured by the Medical Department during that year. The campaign in the Solomon Islands, which revealed a heavy incidence of malaria, made the Medical Department thoroughly aware of the increased demands for Atabrine. Accordingly, an Atabrine program was launched in 1943, which dwarfed the production of prior years. The sole patent holder, the Winthrop Chemical Co., was unable to meet the heavy requirements. The War Production Board, which assumed responsibility for the program, made a survey and found six additional firms that could manufacture the two intermediates of the product. The Winthrop Co. licensed these companies and shared with them its manufacturing knowledge. The principal problem was to increase the production of powder which, in a final step, was

[18] Hornbacher, Arthur: Production of Atabrine. [Official record.] The length and complexity of the manufacturing process is indicated by the fact that 1½ tons of chemicals were required to make 100 pounds of Atabrine—a ratio of 30 to 1. See footnote 15, p. 72.

pressed into tablet form. Some of the new sources produced the complete Atabrine powder. Others manufactured one or both intermediates. Still others manufactured one of the intermediates, received the other from another manufacturer, and then combined the two into the complete Atabrine powder. In addition to the firms developed by the War Production Board to produce the powder, five plants were given contracts to manufacture the tablets. Three of these tabletmakers established units to combine the two intermediates into the complete powder.

From April to June 1943, production increased 60 percent, and by the latter month, the program outlined above was well underway. In December 1943, approximately 85 percent of the scheduled capacity was producing with regularity. Early in the following year, all projected facilities were operating 100 percent of planned capacity, with the result that all requirements (civilian, military, and lend-lease) were being fully supplied. Monthly production of Atabrine was thus increased from 100 million tablets in 1943 to more than 300 million in June 1944. In 1943, a total of 1,758,444,858 tablets were delivered to the Medical Department; this was increased to 2,544,135,000 tablets in 1944. If necessary, 1944's total could have been far exceeded in 1945, but requirements were so fully met that no increase in production was needed during the remainder of the war.[19]

SPECTACLES

Commercial-Type Spectacles

Although spectacles had been furnished to U.S. soldiers in World War I, it was not anticipated that this service would again be required. Indeed, the official belief of the Surgeon General's Office as late as March 1939 was that the American Red Cross could be persuaded to provide any needed spectacles. The Red Cross proved obdurate, but more than a year later, in May 1940, the Army still had not come to grips with the problem. Augmented by the National Guard and by the first increment of draftees under the Selective Service Act, the number of erstwhile civilians in the Army continued to increase throughout the year. But the only provisions for furnishing spectacles to military personnel remained those contained in Army Regulations No. 40–1705, which authorized procurement of spectacles only when they were necessary to correct visual defects resulting from violence suffered in the performance of duty. In all other cases, Army doctors were authorized to make examinations and write prescriptions, but it was the responsibility of the soldier to have the prescription filled at his own expense if he desired spectacles.[20]

However effective this system may have been for Regular Army volunteers, who received an exacting physical examination upon enlistment, it was

[19] See footnotes 13, p. 71 ; and 18, p. 74.

[20] Rybak, Stanley W.: History of the Optical Program. [Official record.] This valuable essay was written by a civilian employee of the Supply Service, OTSG, who was engaged in the optical program for 4 years. Except as otherwise noted, Rybak's account of the optical program has been followed here.

inappropriate for selective service inductees, many of whom were accepted with faulty eyesight. The problem became clear in the first 6 months of compulsory military service. The Medical Department was alerted in May 1941 by the commanding officer of the post hospital at Fort McClellan, Ala., who reported 75 enlisted men with glasses broken in line of duty who could not afford replacements, and others for whom glasses had been prescribed but who had no money to buy them. In less than a month, on recommendation of The Surgeon General, the Medical Department was directed to provide spectacles, repairs, and replacements to all military personnel needing them. In the meantime, a plan had been developed to obtain spectacles by letting contracts with optical suppliers in each of the nine corps areas. Since this would have involved nine separate contracts with widely separated contractors, some of whom were unable to fill the requirements, this plan was abandoned; and a strongly centralized procurement program was adopted.[21]

Requirements.—Neither the official history of the Medical Department's participation in World War I, nor any other available records, contained information as to probable requirements for spectacles. There was, therefore, no basis in experience for the estimate by medical supply officers that 10 percent of military personnel would have defective vision, that one-half of those would enter the Army with their own spectacles, and that the remaining half would have to be supplied with new spectacles or with replacements during the course of a year. In terms of this formula, it was estimated that during 1942 a total of 200,000 pairs of spectacles would be required. Each individual needing spectacles for the efficient performance of his military duties was to receive one pair as soon as possible after induction and a second pair when he embarked for overseas.[22]

After determining requirements and basis of issue, the next step was the selection of the most suitable spectacle frame for military personnel. By a process of elimination, the choice was a metal of 10 percent nickel silver, with reinforced bridge constructed to withstand rough usage. It was discovered later that this frame, in warm climates, corroded easily where it came into contact with the skin, in some instances causing discoloration of the skin and dermatitis. This was corrected by increasing the nickel silver content to 18 percent and by constructing the pad arm, pad arm assembly, endpieces, and cable windings of pure nickel.[23]

When it became known that the Medical Department was launching a large program to supply the troops with spectacles, numerous bids were received from optical companies in all parts of the Nation, but only the American Optical Co. and the Bausch & Lomb Optical Co. had dispensing facilities throughout the country. Of the two, the American Optical Co. was the low

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[21] Letter, Lt. Col. F. C. Tyng, MC, to The Adjutant General, 5 June 1941, subject: Spectacles for Military Personnel.

[22] (1) Recollections of Col. Paul I. Robinson, MC, conveyed to Capt. Richard E. Yates, MAC, September 1944. (2) See footnote 9, p. 75.

[23] See footnote 20, p. 75. In a few cases, it was necessary to furnish Xylonite frames to individuals who were extremely susceptible to dermatitis caused by contact with metal. These requirements, however, were small, and no special provisions were necessary to supply the frames.

bidder and received the contract. It was clear within a few months, however, that the American Optical Co. could supply neither the frames nor the lenses in sufficient quantity. A contract for lenses (called a prescription contract because the product was made to fill individual prescriptions) was then given to the Bausch & Lomb Co., and contracts for spectacle frames were apportioned among nine manufacturers on the basis of their production. These manufacturers constructed the frames and shipped them to the two prescription companies, which then divided them among their branch offices.

This spectacle program was soon beset with many troubles. The original unsubstantiated estimate, that 10 percent of the troops would have defective vision and that one-half of these would enter the Army with their own spectacles, proved to be seriously in error. In fact, 18 to 20 percent of all military personnel required visual correction, and only a very small portion of these entered the service with spectacles sturdy enough to withstand field usage. The need for replacements was scarcely considered in the first estimates; the original requirement figures were thought to be large enough to absorb replacements. But the experience of 1942–43 indicated that a replacement factor of 30 percent annually was necessary.

Delivery problems.—The arrangement under which the soldier received one pair of spectacles while in training and a second pair when he embarked for an overseas station created a heavy burden at the staging areas and ports of embarkation. The optical companies were unable to meet the 3-day deadline, with the result that most spectacles were mailed to APO (Army Post Office) addresses and, in many instances, were never received by those needing them. To solve this problem, orders were issued in 1943 directing the issuance of both pairs of spectacles early in the training period. This change resulted in an ultimate improvement in delivery, but its most immediate effect was to deluge the branch offices with far more prescriptions than they could fill.

The original erroneous estimates of requirements, the changes in the basis of issue, and the increased rate of inductions greatly impeded the spectacle program during 1942–43. It had been estimated that 250,000 pairs would be required in 1943. Actually, 2,250,000 pairs were issued. Since, on the average, 5 months were required to allocate materials, process the frames and lenses, and ship them to branch offices, it is evident that the sudden increase in requirements could not promptly be translated into increased production. The results were soon apparent. Although the contracts stipulated that the spectacles would be delivered not later than 3 days after receipt of an order, it was not unusual for deliveries to be delayed as much as 3 or 4 months. In some instances, men completed their training and were shipped overseas before they received spectacles which had been ordered during basic training. In numerous other instances, spectacles were delivered after the soldier had left the camp in which he had been examined. Eventually, the spectacles were forwarded to his next post, only to arrive once more after the soldier had departed. Thus, spectacles followed soldiers through many posts in the Zone of Interior, and then repeated the process overseas. Some men never received

their spectacles; some had spectacles delivered to them at a place and time so far removed from the eye examination that all memory of the refraction and the prescription had been erased from their minds.[24]

Most delivery problems arose because production could not keep pace with rising requirements, but some were due to other causes. The Bausch & Lomb Optical Co. established 12 shops, strategically located throughout the country, which concentrated their attention exclusively upon military orders. Since the total capacity of these shops exceeded by 10 percent the quantity of spectacles under contract, slow deliveries were not numerous after requirements had been stabilized. The American Optical Co., on the other hand, depended upon a network of 250 branches and affiliated companies, each with a daily capacity ranging from 30 to 300 jobs. A portion of this capacity, however, was necessarily devoted to civilian needs. The larger branches, moreover, were located in the larger cities while Army camps tended to be remote from centers of population. An early attempt was made to hasten deliveries by the establishment of "farm-out points." When prescriptions received by a branch exceeded the capacity allocated to military orders, the surplus was reported to the zone headquarters, which farmed out the work to another branch office. This system was satisfactory, except that much time was consumed in transmitting surplus prescriptions to a zone headquarters and then to another branch. At the insistence of the Medical Department, the procedure was changed so that any overflow of work was immediately and directly farmed out to the nearest branch office, and the latter delivered the spectacles to the Army installation which placed the orders. This change produced some improvement; but when the war ended, medical supply officers were convinced that the American Optical Co. could have given better service had it emulated the system of Bausch & Lomb.

Some delays in delivery were caused by the medical installations which performed the eye examinations. They frequently kept prescriptions on hand until 7–10 days had elapsed, and then mailed the accumulated total to the branch office of the optical company. Usually this represented several times the capacity of the branch office, and thus it was impossible for that office to allocate its work to provide the 3-day service for which the contracts called. Many letters were written to the service command headquarters of the negligent installations, inspecting officers of the Surgeon General's Office protested vigorously, and crisply worded directives were issued on the subject. But failure attended all these efforts to persuade the eye clinics to mail their prescriptions daily. When the war ended, a large number of the clinics, in quiet defiance of the directives, continued to accumulate the prescriptions and to send them en masse to overworked branch offices.[25]

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[24] Spectacles that could not be delivered were shipped to the central stockpile at Binghamton Medical Depot. Their salvage value was small, for only the fronts and temples could again be utilized. The lenses, which constituted two-thirds of the cost, were scrapped. Only an expensive and elaborate salvage system could have made it possible to use them.

[25] (1) War Department Pamphlet No. 8–5, 20 June 1944, subject: Procurement of Spectacles for Military and Other Authorized Personnel. (2) See footnote 20, p. 75.

Payment techniques.—Even after the spectacles had been delivered and the soldier was pursuing his training duties with corrected vision, there still remained a serious and troublesome problem—auditing the optical company's invoice and certifying it for payment. At the beginning of the spectacle program, all invoices were forwarded to the Finance Branch, Finance and Supply Service, and there were audited and sent to the Finance Office for payment. This function was soon decentralized to 12 fiscal branch offices throughout the country, and eventually was concentrated in the regional fiscal office at St. Louis, Mo. But the auditing of spectacle invoices, wherever it was accomplished, involved a unique problem and a prodigious amount of work. For each pair of spectacles, unless two pairs were ordered for the same individual at the same time, there was a separate invoice which carried an individual price. The uniqueness of the problem lay in the fact that the accuracy of each price had to be determined by interpreting the prescription and by comparing the invoice price with the contract price stipulated for that particular correction. The prodigious amount of work arose from the fact that thousands of these invoices poured in each month. In the original contracts, a price was indicated for almost every conceivable visual correction. Since the ophthalmological profession did not subscribe to the view that prescriptions should be written in a uniform manner, the interpretation and transposition of prescriptions became necessary.

At first, the officers and civilian employees of the Finance Branch attempted to audit these invoices by following traditional methods. But when the documents had piled up in such quantities that their sheer bulk seriously restricted the amount of space left for typewriters, adding machines, and other office equipment, it became necessary to improvise speedier and more effective procedures. This was accomplished by the adoption of an "assembly line" method, in which each clerk performed a single auditing function on each invoice and then passed it on to the next clerk. The advantages derived from this division of labor enabled the fiscal officers to reduce the huge backlog, but the enormous amount of work involved convinced them that invoices for spectacles should be audited in the fiscal branch offices established early in 1943. When the work was decentralized to the field offices, the assembly line method was retained; and, after the auditing of all spectacle invoices was concentrated in St. Louis, a high degree of speed and efficiency was obtained.

Even after these improvements, the optical companies complained that payments were being delayed, sometimes for as long as 5 or 6 months after an order had been filled. An investigation revealed that many medical installations retained the order form [26] until a large number had accumulated before they were forwarded to the fiscal branch office. This was caused, in part, by allowing the order forms to accumulate for weeks, and in some instances for

[26] The order form was a combined delivery order, contractor's invoice, and receiving report. The delivery order was signed when the spectacles were prescribed, the contractor's invoice was signed when the spectacles were shipped, and the receiving report was signed when the spectacles arrived at the medical installation that had ordered them. This three-part form and the appropriate contract constituted all the documents needed to audit the account and certify it for payment.

months, before the medical supply officer took a day off to sign the receiving reports. Some improvement was effected by directing the medical supply officers to sign each receiving report on the day the spectacles arrived, and by instructing the installations to forward order forms to the fiscal branch offices in groups of 100, or at least once weekly if this number had not been accumulated.

No figures are available which show the total cost of the spectacle program, but prices stipulated in contracts indicate that the spectacles were procured at a moderate cost. The metal frames, throughout the war years, cost about $1 per pair. For simple visual corrections, lenses cost as little as 75 cents; for the more complex corrections, the cost rose to as high as $6. Considering all types of corrections, however, the Army procured complete spectacles at an average price of approximately $2.50 per pair.

Gas Mask Spectacles and Inserts

The visual defects in soldiers which led the Army to furnish commercial-type spectacles made it necessary to provide for spectacles to be worn beneath the gas mask. The most important problem involved in this program was the design of the spectacle frames. The British attacked the problem by producing all-purpose spectacles, practical for ordinary wear and for wear beneath the gas mask. This was a round-eye frame with the endpiece flush against the eye wire and with flat temples. The Germans and Japanese, on the other hand, provided spectacles of the goggle variety which were held to the face by an elastic band encircling the head.[27]

In the design of gas mask spectacles for U.S. military personnel, both types were considered. The German and Japanese type was rejected as unsuitable, for the elastic band forced the bridge of the goggle frame too severely against the nose, causing great discomfort. In addition, this elastic band caused a leakage at the temples. The British-type spectacle was finally adopted after changes were made which, it was believed, rendered it suitable for wear beneath the Army gas mask. After some tests were made, the spectacles were procured and issued in the manner already described for commercial-type spectacles. At first, it was directed that all individuals requiring visual correction be furnished gas mask spectacles when they moved to a staging area or a port. On this basis of issue, the requirements were very high, while the period of time for issue was so short that many men were shipped overseas without the spectacles. Regulations were soon changed to provide that only those individuals with a binocular visual acuity of 20/70 or worse would be furnished gas mask spectacles; these men were to be fitted when their unit was alerted, which allowed 4 to 12 weeks for prescription and issue. This proved to be ample.

Difficulty was also encountered in fitting the spectacles (fig. 13), and in keeping them in adjustment; but there was another and far more serious defect. When the gas mask spectacles were worn, closure of the mask was not com-

[27] See footnote 20, p. 75.

FIGURE 13.—Fitting gas mask spectacles in the European theater before D-day.

plete, and a leakage at the temples was produced. Why this was not discovered when the spectacles were first tested has not been satisfactorily determined; but obviously upon the basis of inadequate and misleading tests, an unsuitable type of gas mask spectacles was adopted, and at least 100,000 pairs were procured and issued. Not until complaints had been received from the field did the Medical Department become aware of this serious defect. Exhaustive tests were then instituted, which proved that the spectacles were entirely unsuitable because they induced discomfort and caused the gas mask to leak. A directive was immediately issued, prohibiting their use with the gas mask and directing that they be employed as an auxiliary pair for ordinary wear.

This development left the U.S. Army, in 1943, without any type of visual correction to be worn beneath the gas mask. Very promptly, however, the "gas mask insert" (officially designated as the M–1 Gas Mask Eyeglass) was designed and accepted as standard.[28] This consisted of an eye wire supported by three brackets and attached to a frame inserted beneath the gas mask next to the lens. The fitting problems were far more complex than those encountered

[28] Although procured and distributed in large numbers, the gas mask insert was never considered to be more than a satisfactory makeshift. There is no record, however, of any efforts to develop a more satisfactory device. Instead, supply officers of the Medical Department appeared hopeful that the Chemical Warfare Service would ultimately design and adopt a gas mask with which the commercial-type spectacles could be worn. This hope never received any encouragement.

in commercial-type spectacles. Each individual appeared with his gas mask, and the position he required was then determined. Later in the program, this was simplified by the adoption of a plastic guide which was marked with the standard positions.

The basis of issue of the gas mask inserts was the same as that finally adopted for the gas mask spectacles. Military personnel alerted for overseas movement and who had a binocular visual acuity of 20/70 or worse were supplied with the inserts. Procurement requirements were rather moderate—approximately 7 percent of all military personnel, with an annual maintenance or replacement factor of 30 percent.

Prescribing and fitting gas mask inserts in Zone of Interior installations involved no important difficulties other than those mentioned above, but overseas distribution was far more complicated. By the time the insert was developed (summer of 1943), large numbers of troops were overseas, none of whom had any suitable visual correction for use with the gas mask. Queries were addressed to the various theaters of operations, which in reply sent requirements figures to the Surgeon General's Office. Stocks of fitting cases, frame inserts, and pre-edged lenses of all conceivable foci were shipped to the theaters, but there were many delays before military personnel overseas were equipped with this type of visual correction. If gas warfare had been employed in 1942 and 1943, uncorrected visual defects clearly would have appreciably weakened American fighting forces.

Optical Repair Units

For the repair and replacement of commercial-type spectacles and gas mask inserts in overseas installations, the Medical Department developed a number of repair units and, in addition, established a stockpile at the Binghamton Medical Depot, N.Y., which furnished these units with frames, lenses, and other ophthalmic supplies.

In 1942, the Mobile Optical Repair Unit was developed (fig. 14). This consisted of edging equipment, miscellaneous optical machinery (without surfacing equipment), and a large assortment of lenses, screws, and frames. The entire unit was carried in a 2½-ton truck, but was designed to be removed easily and operated in a building. Eight units were purchased and shipped to overseas installations, but the need was soon felt for a self-contained unit that could be operated in the truck body. This led to the development of a second mobile unit in which the optical equipment was permanently housed in a 2½-ton truck. The unit was heated, had water and lights, and could be operated under all weather conditions. In designing this unit, it was decided that all equipment should be permanently mounted on benches and that these benches should be securely attached to the floor of the body (fig. 15). Later experience suggested, however, that it would have been wiser to make the

FIGURE 14.—Mobile optical repair unit which enabled repair of spectacles closer to frontlines.

equipment removable, for occasionally a unit operated far behind the lines and could have done better work in a building.[29]

In addition to these two units, a third was devised in 1943. Called the Portable Optical Repair Unit, it was operated by two men and was transported by jeep and ¼-ton trailer (fig. 16). It consisted of two Medical Department chests containing a moderate assortment of lenses and frames, a hand-operated edging machine, a cutter, and miscellaneous optical tools. Experience in the field indicated that this unit did not carry a sufficiently wide range of foci and that the edging machine was difficult to operate. Accordingly, a third chest was recommended for standardization, which would include additional lenses, fronts, temples, and an electric motor to be used with the edging equipment. Before the third chest could be placed in procurement, the war ended and the plan was abandoned.

When the repair units were first distributed to overseas troops, the basis of issue was one mobile unit and two portable units to each medical supply depot.[30] The mobile unit, operating with the depot, could perform about 100

[29] See footnotes 9, p. 67; and 20, p. 75.

[30] It was soon discovered that this basis of issue produced a waste of optical repair facilities; and in April 1944, a new Table of Organization and Equipment 8–500 provided a mobile unit for each 150,000 troops, to be augmented by one portable unit when troops were scattered over a large area.

FIGURE 15.—Interior of mobile optical repair unit.

jobs a day; each portable unit, moving with depot sections, furnished optical repairs and replacements to troops in forward areas, its capacity being 15 to 20 prescription jobs a day. So far as maintaining the efficiency of combat troops was concerned, these units were valuable adjuncts to the medical service. Before they were used, soldiers who damaged or lost their spectacles were sent far to the rear for replacements, resulting in much lost time and a drain upon transportation facilities. There is reason to believe that many spectacles were deliberately damaged or thrown away by soldiers who were eager to move back from the fighting lines. When mobile and portable units accompanied field armies, repairs and replacements were made in forward positions

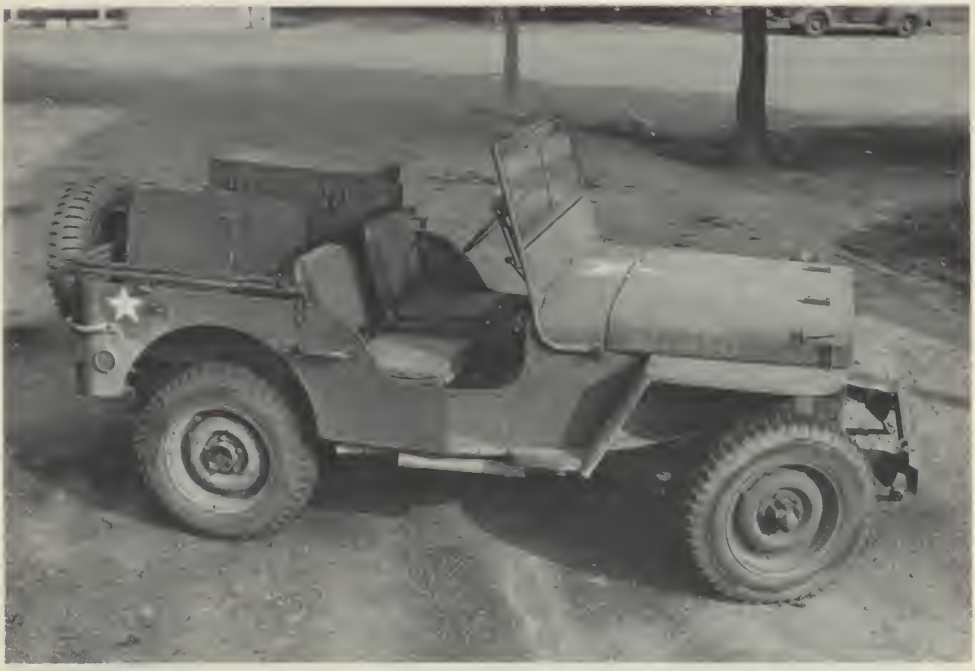

FIGURE 16.—Portable optical repair unit loaded on jeep (¼-ton vehicle).

with a minimum loss of time (fig. 17). Line officers noted with pleasure, but with little astonishment, that the need for spectacle repairs diminished when the repair units began to operate near the fronts. During the fiscal year ending 30 June 1945, approximately 500,000 pairs of spectacles were repaired or replaced in all theaters of operations. This was accomplished by 50 mobile units and 100 portable units.[31]

Continuous support from the Zone of Interior in both personnel and supplies was required to operate the repair facilities overseas. To each mobile unit, one officer and six enlisted men were assigned, while two enlisted men operated the portable unit. These skilled personnel were provided by a training school at the St. Louis Medical Depot, where officer and enlisted personnel having optical experience in civilian life were given an orientation course and were instructed in the use of Army equipment. The graduates of this 6-week course were assigned to medical depot companies, which, in turn, formed a part of field armies.

To supply the optical repair units with stocks of frames, lenses, tools, and equipment, an optical stockpile was established at the Binghamton Medical

[31] (1) See footnote 3(2), p. 64. (2) The extent to which these units preserved the fighting efficiency of the troops is indicated by a report of optical activity in the European theater during the first half of 1945. The author of that report estimated that it would have been necessary to evacuate approximately 10,000 per month if repair facilities had not been available on the spot. *See* Greear, Lt. Col. James N., Jr., MC: Semi-Annual Report for Ophthalmology, 1 Jan. to 30 June 1945, European Theater.

FIGURE 17.—Portable optical repair unit in use at Oahu, Hawaii.

Depot. This stockpile contained large quantities of lenses, fronts, temples, nosepads, screws, surfacing machines, edgers, lensometers, lens cutters, and other supplies and equipment. The active theaters of operations established stockpiles of their own, maintained by requisitioning from the Binghamton Medical Depot, to supply the needs of the repair units. All requisitions from theaters were first edited by the Supply Service of the Surgeon General's Office, and then transmitted to Binghamton. This editing served the twofold purpose of consolidating issue experience and maintaining control over the distribution of scarce items.[32]

[32] See footnote 20, p. 75.

ARTIFICIAL EYE PROGRAM

Before World War II, glass used in the manufacture of artificial eyes, as well as the glass eyes themselves, were imported from Germany and other foreign sources. As early as 1917, an interest was evidenced in domestic production of artificial eyes for the Army. To further this end, a series of experiments were conducted; although adequate glass eyes were ultimately produced, they were not equal in quality to those of foreign manufacture. These experiments were discontinued before World War II when a survey indicated that domestic dealer stocks would probably be adequate to meet Army demands.[33] This judgment appears to have been sustained by the course of events for a long time. Artificial eyes were procured on an individual basis by local purchase from the nearest civilian shop dealing in these items. Even the requirement that purchase requests be submitted to the Surgeon General's Office for approval before procurement action was dropped in August 1942.

Not until July 1943 was there any need for an overall supply program. At that time, the New York Medical Department Procurement District was directed to purchase 30,000 artificial eyes for use in overseas theaters. They were to be stocked at the Binghamton Medical Depot, for export and distribution. Since there were then no stocks of U.S. artificial eyes in the European theater, supply to members of the U.S. Army in that theater was accomplished by procurement through British channels. Demands for artificial eyes continued to increase during the latter part of 1943 as a result of battle casualties and induction of personnel with one sightless eye. It has been estimated that between 8,000 and 10,000 men with only one eye were inducted into the service.[34]

These developments forced the establishment of an artificial eye program late in 1943. The Medical Department employed an expert technician and purchased a large assortment of glass eyes from the country's depleted stocks. Each eye purchased was handpicked by this technician. The best quality eyes thus obtained were hurriedly shipped to the theaters of operations, where the need was rapidly becoming acute. Each Army hospital in the Zone of Interior received a quantity of eyes, and the remainder were placed in the optical stockpile at Binghamton. In addition, a number of expert artificial eyemakers were employed to visit Army hospitals and to furnish custom-made artificial eyes to patients who could not be properly fitted with stock eyes.[35]

These measures proved to be effective for only a few months. Following the Normandy landings, casualties needing artificial eyes threatened to exhaust the available resources. It was becoming clear, also, that glass artificial eyes possessed certain characteristics that rendered them unsatisfactory for military personnel. The glass eye, either stock or custom-made, became discolored and

[33] Medical Department, United States Army. Surgery in World War II. Ophthalmology and Otolaryngology. Washington: U.S. Government Printing Office, 1957, pp. 33–35.

[34] Randolph, M. E.: History of the Artificial Eye Program (Glass and Plastic), 2 Jan. 1946. [Official record.]

[35] Annual Report, Optical Section, Army Medical Purchasing Office, 1945.

roughened after 18 to 24 months, thus creating a large and continuous replacement problem. In addition, the glass eye was subject to accidental and intentional destruction; of the latter, there appears to have been a considerable amount, especially among the one-eyed inductees. Many individuals considered their induction to be unnecessary for the Army and unduly burdensome to themselves. They retaliated by dropping or breaking their glass eyes while inserting or washing them. This led to their hospitalization for several weeks, awaiting the arrival of stock eyes. When the replacements were received, the patients asserted that the new eyes did not fit and that they could not bear the resultant discomfort. Whereupon they were sent to one of the general hospitals, and there waited 1 or 2 months while custom-made eyes were prepared for them. Under these circumstances, many individuals were issued three or four artificial eyes during a single year, with a consequent hospitalization of 6 or 8 months.[36]

Still another disadvantage was attached to the procurement and issue of glass artificial eyes. They were manufactured in the United States by a few highly skilled craftsmen. Under ordinary circumstances, it would have been difficult to recruit and train additional eyemakers, and thus increase production. But the circumstances were not ordinary. The craftsmen who manufactured glass eyes looked upon themselves as the possessors of lucrative trade secrets, which they had no intention of imparting to others. They possessed a monopoly, and they were determined to maintain it. Consequently, the production of this item could not be appreciably increased.

The foregoing disadvantages of the glass eye led the Medical Department to seek a substitute. While on a trip to the European theater early in 1944, The Surgeon General learned that Capt. (later Maj.) Stanley F. Erpf, DC, and Capt. Sidney J. Karash, MC, had been experimenting with the fabrication of plastic artificial eyes since July 1943. Captain Erpf was recalled to the United States and, with two other dental officers—Majors Victor H. Dietz, DC, and Milton S. Wirtz, DC—was transferred to Valley Forge General Hospital, Phoenixville, Pa., to develop a plastic eye. By the end of September 1944, the developmental process was complete. An acrylic artificial eye was produced which was superior to any type of prosthesis previously used. The iris was more closely duplicated; the fit was more nearly exact; the eye would not break; it could be worn for long periods of time without cleaning; and, most important of all, it could be fabricated from domestic raw materials by technicians of modest training and experience.

The manufacturing process was comparatively simple and required only about 40 man-hours for each eye. After 100 patients had been satisfactorily

[36] See footnote 34, p. 87. There is no direct evidence tending to prove that the glass eyes were intentionally broken; but the widespread incidence of breakage, so much higher than in civilian life, and the resentful attitude of the men together offer a strong presumption that many alleged accidents were in fact intentional.

fitted with the new eye, it was decided that only the plastic artificial eye would be issued in the future. A training program was instituted at Valley Forge General Hospital; and the co-inventors taught 12 dental officers, who were then ordered to 12 general hospitals strategically located throughout the country. To these general hospitals, all patients needing artificial eyes were transferred. As the number of eye casualties increased, additional officers were trained, so that by July 1945, 32 general hospitals had established laboratories for the fabrication of plastic artificial eyes. During the period December 1944 to December 1945, these general hospitals fitted 7,500 patients with the plastic eye.[37]

In the meantime, the theaters of operations were affected by these developments. As a part of the program in the United States, several dental officers were trained and sent to the Pacific theaters to introduce the new prosthesis. The European theater opened its own school and trained dental officers in eye fabrication. These officers were then dispatched to general hospitals in France and Germany, where they produced plastic eyes for battle casualties. No figures are available which show the number of eyes fabricated in overseas installations, but it is known that the speedy production and fitting of this prosthesis made a significant contribution to the medical service in combat areas.

HEARING AIDS

Early in the war, The Surgeon General established the policy that hearing aids would be furnished to military personnel suffering from hearing defects incurred in line of duty and in certain other special cases. Aural rehabilitation centers were established at Deshon General Hospital, Butler, Pa.; Hoff General Hospital, Santa Barbara, Calif.; and Borden General Hospital, Chickasha, Okla. These centers were furnished special personnel and equipment and were authorized to purchase the appropriate hearing aids from local distributors. The purchase price, which included servicing, ranged from approximately $135 to $160 each.

The Medical Supply Service during mid-1944, in consultation with the Surgical Division of the Surgeon General's Office and upon advice of the National Research Council and Harvard University, developed a list of satisfactory commercial hearing aids. It was determined that a considerable saving in cost could be effected by centralized procurement directly from the manufacturers. Open-end contracts were accordingly let with several hearing aid firms for approximately 1,000 instruments. These contracts permitted the three aural rehabilitation centers to order prescribed hearing aids directly from the manufacturer, at a cost approximating $50 each.

[37] (1) See footnote 34, p. 87. (2) Plastic Artificial Eye Program, Valley Forge General Hospital, 1945. [Official record.] (3) War Department Circular No. 398, 10 Oct. 1944. Section I: Artificial Eye Program.

FIGURE 18.—Fitting a hearing aid.

Concurrently with the establishment of central procurement, a program was developed to furnish each new user with a listing of repair parts peculiar to his type of instrument and with a letter of authorization to obtain a "loaner" hearing aid through medical supply channels if his personal instrument became defective (fig. 18). He was also furnished with a 3-month supply of batteries and cords. Replacements could be obtained from his nearest aural rehabilitation center. Medical supply within the centers was responsible for returning all defective hearing aids to the appropriate manufacturer for repair.

The method of central procurement remained in effect until 1 June 1945 when aural rehabilitation centers were directed to submit requisitions for hearing aids and accessories directly to the Chief, Inventory Control Branch, Army Medical Purchasing Office.[38]

[38] (1) War Department Circular No. 192, 27 Aug. 1943. Section VI: Hearing Aids for Military Personnel. (2) War Department Circular No. 235, 12 June 1944, subject: General Hospitals for Specialized Treatment. (3) See footnote 3(2), p. 64.

ORTHOPEDIC EQUIPMENT AND SUPPLIES

Orthopedic Shops

At the beginning of World War II, certain prewar named general hospitals were authorized orthopedic shop equipment, but the capability of each varied. All of these hospitals were directed to meet individual requirements beyond their capability through local procurement of commercial items. With the mushrooming of hospitals throughout the country, many in isolated areas, and with troops being mustered in by the thousands, accidents increased proportionately; hence, the Medical Supply Service was suddenly besieged with requests for orthopedic facilities. Many hospitals at posts, camps, and stations, however, needed only limited facilities to prepare patients for evacuation to designated hospitals for definitive treatment.

At the outset, there was no standard list of equipment and supplies for authorized shops. Furthermore, some steel items being supplied to existing shops by medical depots from World War I stocks were found to be unsatisfactory. Attempts to effect local procurement of steel were hampered by War Production Board controls. The situation was reviewed in June 1943, when it was decided that all named general hospitals (eventually 65) and 6 specific station hospitals should have orthopedic shops (fig. 19). The only exception was Darnall General Hospital, Danville, Ky., which had mostly neuropsychiatric patients. By mid-September, equipment lists for an orthopedic shop (equipment and supplies) and occupational therapy equipment had been updated including addition of new items. The St. Louis Medical Depot was designated as the key depot for orthopedic supplies, but station requisitions were to be submitted to designated distribution depots for editing before being transmitted to St. Louis for supply action.

The number of named general hospitals meanwhile increased steadily. Convalescent and additional station hospitals were added to the list of those authorized to operate shops, while other hospitals, already on the list, were expanded to the extent that their shop facilities were inadequate. Also, new items were added to the equipment list for shops, and additional tools were required for training technicians (fig. 20). Certain items were procured by The Quartermaster General and delivered to medical depots, but virtually every item of orthopedic equipment and supply, such as machines, steel, and leather, encountered a low priority rating from the War Production Board.

Delays ensued, and constant and aggressive action by the Medical Supply Service was imperative to obtain material and spread the meager available stocks to the best advantage in the face of valid demands from the hospital. In January 1944, the situation was again reviewed by Col. (later Brig. Gen.) Edward Reynolds, MAC, Chief of the Supply Service, and Col. Leonard T. Peterson, MC, Orthopedic Consultant to The Surgeon General. Colonels Reynolds and Peterson concluded that availability of trained orthopedic technicians was a better guideline for establishing and enlarging orthopedic shops

FIGURE 19.—Artificial limb fitting laboratory, Lawson General Hospital, Atlanta, Ga.

FIGURE 20.—Technicians make artificial limbs in the Processing and Fitting Shop. Lawson General Hospital, Atlanta, Ga.

than was the patient load. Long-range planning, assuming an adequate supply of technicians, was to be based on 40 percent orthopedic patients in general hospitals and 66 percent in convalescent hospitals. To meet this load, orthopedic shop equipment would have to be increased by 30 percent.[39]

Shoes

Requirements for orthopedic shoes for severely deformed feet surpassed the capability of the shops, and eventually the volume was so great that local procurement became impractical. In January 1945, The Quartermaster General

[39] (1) Memorandum, Maj. Frederick Fink, MC, Chief, Procurement Advisory Branch, to Chief, Supply Service, 15 June 1943, subject: Orthopedic Shops. (2) Supply Service Code Letter IX–31, 22 Sept. 1943, subject: Station Stock Control—Orthopedic Shops. (3) Supply Service Code Letter IX–33, 29 Sept. 1943, subject: Station Stock Control—Orthopedic Shop Equipment. (4) Memorandum, Col. S. B. Hays, MC, Director, Distribution and Requirements Division, to Mr. [Edward] Reynolds, Acting Chief, Supply Service, 4 Oct. 1943, subject: Orthopedic Shop and Occupational Therapy Equipment. (5) Memorandum, Col. Edward Reynolds, MAC, to Lt. Col. [Oscar B.] Griggs, MC, Issue Div., and Maj. [Alvin F.] Schultz, MAC, Requirements Branch, 6 Jan. 1944, subject: Preliminary Orthopedic Shop Requirements for Expanding General and Convalescent Hospitals.

accepted responsibility for the item on a reimbursable basis. At that time, instructions were published to the field on the source of supply and method of acquiring orthopedic shoes. Prescriptions were prepared by medical officers; in severe cases, a cast of the foot was furnished to the Boston Quartermaster Depot, Boston, Mass. Less serious requirements were supplied by the nearest quartermaster shop or through local procurement.[40]

Prostheses

General hospitals designated as amputation centers were directed to furnish prostheses for amputees. Such centers obtained components under contracts established by the Supply Service of the Surgeon General's Office. Shops for each center fabricated the stump sockets and assembled the components, adjusting and fitting each prosthesis to the patient (fig. 21). Upon discharge from the Army, in addition to the prostheses, each amputee was issued one pair of shoes and three light woolen stump socks for each amputation. He was advised that replacements of stump socks would be furnished by facilities of the Veterans' Administration.

By 1944, production was not keeping abreast of requirements and there was a desire to improve the prostheses. After considerable experience and study, it was estimated that 500 artificial hands would be required by the Army during fiscal year 1945. One firm was located which produced a satisfactory item. Each hand was fabricated manually, however, with a maximum monthly production of 8 to 10. Efforts by the Surgeon General's Office to place a contract with this firm for 200 hands were fruitless because the output was already committed for the Navy and Veterans' Administration. The best that could be done was an agreement among representatives of the armed services, the War Production Board, and the manufacturer that the latter should be assisted in obtaining the necessary machine tools and jigs to increase production. It was expected that such assistance would permit an output of 50 to 60 hands per month for the Army. Further study and experience suggested combined requirements for Army, Navy, and Veterans' Administration would total 2,000 artificial hands for calendar year 1945. Hence, in October 1944, The Surgeon General was authorized to contract for that quantity at a price sufficiently high to permit the company to amortize the cost of necessary equipment. Under this arrangement the Navy Department and the Veterans' Administration requisitioned their requirements from the Surgeon General's Office. In early December, the contract was canceled because of the contractor's failure to cooperate, and a new contract was awarded to another firm at a lower cost.

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[40] (1) War Department Circular No. 152, 3 July 1943, Section IV: Minor Orthopedic Shoe Adjustments and Repairs. (2) Letter, Maj. W. J. Tobin, MC, Chief, Orthopedic Section, Cushing General Hospital, to Col. Leonard T. Peterson [MC], OTSG, 22 Nov. 1944, subject: Report of Meeting Relative to the Construction of Specially-built Shoes. (3) OTSG Code Letter IX–206, 12 Feb. 1945, subject: Station Stock Control—1. Requisitions for Special Measurement Shoes. (4) Letter, Col. Leonard T. Peterson, MC, to The Surgeon General, 26 Mar. 1945, subject: Special Built Shoes. (5) Letter, Brig. Gen. Raymond W. Bliss, Chief, Operations Services, OTSG, to Office of The Quartermaster General, attention: Maj. D. W. Black, QMC, 2 Apr. 1945, subject: Special Built Shoes. (6) War Department Circular No. 346, 16 Nov. 1945, Section IV: Footwear.

FIGURE 21.—Making the final adjustment on a prosthesis.

Concurrently with this action on artificial hands, in the fourth quarter of 1944 the Soviet Purchasing Commission requested information regarding availability of artificial limbs for the Russian Government. Although no firm requirements were given, it was indicated that probably 50,000 to 100,000 limbs would be required. Anticipating firm requirements from the Russians, and because the Medical Department had encountered considerable difficulty in obtaining deliveries of artificial limbs in the quantities required by the Army's amputation centers, a review of artificial limb production was initiated.

Artificial limbs also had been produced in this country by several small firms and, here again, interchangeability of parts was virtually nil. To meet

Russia's potential demands and U.S. Army requirements, a program was initiated to develop improved limbs with standard interchangeable parts which could be manufactured on a volume basis. Furthermore, it was agreed that limbs should be of such design that competitive bids could be obtained.

During the first quarter of 1945, the National Bureau of Standards and several representatives of limb manufacturers were consulted to resolve the problem. The best features of limbs submitted by the various manufacturers were adopted and specifications were written to incorporate the selected features. Specifications for the composite limb were written so that the fiber, metal, or plastic shin sections and thigh sections could be furnished, and the limbs could be assembled from a standard scale of sizes by orthopedic shops at amputation centers. Although this program gained some ground in standardization, it did not attain the anticipated perfection on interchangeability.[41]

BOOKS AND JOURNALS

Books

Before World War II, a monetary credit was established at the New York General Depot for professional books required by stations worldwide. Requisitions were submitted by these activities to the New York General Depot where annual procurement was made and distribution effected.

By the latter part of 1942, selected books had become standard items of supply, having been added to the Medical Supply catalog and to Medical Department equipment lists. Medical units were authorized to submit requisitions, using standard equipment lists or other tables of authorization as a basis for completing their libraries.

In November 1942, the Medical Section of the Chicago Quartermaster Depot, Chicago, Ill., was designated as the key depot for procurement, storage, and issue of professional books (fig. 22). Stations, however, submitted requisitions to their regular distribution depot for editing, approval, and forwarding to Chicago.

The Surgeon General's Office prepared requisitions for furnishing books for unit assembly programs assigned to individual depots. Books were not packed in Zone of Interior assemblies; instead, when the requisition was prepared, a simultaneous requisition was sent to the Chicago Quartermaster Depot for direct shipment of the appropriate books to the station.

Beginning with fiscal year 1944, a specified monetary allowance was also granted each Zone of Interior station, against which it could select and purchase professional books not included in authorization lists. This action further

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[41] (1) War Department Circular No. 347, 25 Aug. 1944. Section I: General Hospital. (2) War Department Circular No. 367, 9 Sept. 1944. Section II: Amputation Center. (3) Supply Service Notes For The Surgeon General s Notebook (8 September to 22 September), 22 Sept. 1944. (4) Supply Service Notes For The Surgeon General's Notebook (23 October to 8 November), 8 Nov. 1944. (5) Supply Service Notes For The Surgeon General's Notebook (8 December to 26 December), 26 Dec. 1944. (6) See footnote 3(2), p. 64.

FIGURE 22.—Packing room and book section, Medical Section, Chicago Quartermaster Depot.

decentralized control of book purchasing and distribution and proved to be most satisfactory.

Until the latter part of 1943, books were purchased mostly from dealers, since their price quotations were practically identical with those of the publishers, with the advantage of cutting down materially on the number of contracts to be written. Because most publishers were having difficulty in obtaining sufficient paper stocks under the War Production Board priority system, a meeting was held in November 1943 attended by publishers, dealers, and Medical Department procurement personnel. It was decided that future quantity purchases would be placed directly with the publishers. Only if the quantity of books purchased was small would the Medical Department buy from dealers as in the past.

In March 1944, procurement of books was assigned to the Army Medical Purchasing Office, excepting emergency shipments for overseas, which could be purchased by the St. Louis Medical Depot if necessary. In the meantime, storage and issue of all professional books was assigned to that depot.[42] Accordingly, all books in stock at the Chicago Quartermaster Depot were shipped to St. Louis.

[42] War Department Supply Bulletin SB 8–3, 21 Mar. 1944, subject: Medical Department Professional Books.

Due to the publication of new editions of professional books which resulted in stocks becoming obsolete, it was decided shortly after the war to abandon the practice of purchasing books for stock.

Journals

Before World War II, the Surgeon General's Office placed subscriptions for professional journals determined to be required by medical units throughout the Army. This system continued until mid-1943, when a monetary allowance was provided against which stations could purchase journals of their own selection which did not appear in the allowance list.[43]

Purchasing or placing of subscriptions for Medical Department professional journals was transferred from the Surgeon General's Office to the Army Medical Purchasing Office at the same time that book purchasing was transferred, in March 1944.[44]

One of the main difficulties with journals was that of late receipt or nonreceipt by units in the overseas theaters. During the early part of the war, journals were sent to the headquarters of the various theaters for subsequent redistribution or circulation to Medical Department units within their commands. Complaints of late receipt were continually received in the Surgeon General's Office until the practice was discontinued in late 1943. From that time, journals were mailed by publishers or dealers directly to the APO for individual medical units. This system also soon came under fire as it was next to impossible to keep current addresses for continually moving units. Further, the Internal Security Division maintained that changing APO numbers constituted a security breach, and directed that the first APO number assigned to a unit should be used in all future mailings of journals. Activation and deactivation of units brought forth a perpetual flow of correspondence relative to procedures for supply of journals, a problem that remained until the end of the war.

PROPERTY EXCHANGE ITEMS

The Medical Service had a peculiar problem relating to those items of supply and equipment which were evacuated with patients. Commonly called "property exchange items," these comprised blankets, litters, pajamas, splints, tracheotomy tubes, and Levin tubes, which had to be conserved and used again. In the classical system of property exchange, each element in the evacuation chain was stocked with these items. When a vehicle of whatever sort discharged its patients, it received an exact replacement for those items that accompanied the patient. The vehicle then returned to its forward point of origin and similarly replaced the items in that element. The system could be

[43] SGO Circular Letter No. 126 (Supply No. 36), 16 July 1943, subject: Medical Books and Journals, Including Authorization for Limited Local Procurement.

[44] War Department Supply Bulletin SB 8–4, 21 Mar. 1944, subject: Medical Department Professional Journals.

operated, at least in theory, from the frontlines back through the communications zone to the Zone of Interior and to the hospital of final destination.[45]

Wherever the classical system of property exchange could be used, the forward elements in the chain of evacuation were automatically restocked and problems were minimal. Where it could not be used, the forward elements were rapidly depleted of these items and problems of resupply developed.

The system works more smoothly when motor ambulances, hospital trains, and hospital ships, all under medical control, are the vehicles used. When vehicles serve a dual purpose of evacuating patients to the rear and of carrying personnel or general supplies on their trips forward, the system breaks down and other means must be used to replace losses in the forward elements. In World War II, evacuation of patients by air, whenever practicable, soon became the method of choice. Almost all cargo planes were equipped with brackets and straps to hold litter patients. Rarely, however, on their trips forward did these planes carry medical property exchange items. Other cargo, either personnel or supplies, usually had a higher priority. The consequent inability to utilize the classical property exchange system, except on a small scale, resulted in huge requirements for these items to keep the slow-moving supply pipeline full and assure replenishment in forward units. Blankets and litters, for example, were under constant procurement throughout the war, and reserve stocks were positioned in the Zone of Interior and at many points overseas.

[45] Based on recollections of Maj. Gen. Silas B. Hays, formerly Chief, Supply Service, European theater, and later The Surgeon General.

CHAPTER IV

Maintenance and Repair Parts

EVOLUTION OF MAINTENANCE REQUIREMENTS

Although medical equipment maintenance in the Army came into being with acquisition of the first technical instrument, it did not gain the status of an organized program until World War II when the influx of technical equipment into the supply system became a flood. Each incoming wave of more varied and complex equipment imposed problems and maintenance requirements which surpassed the existing or planned capability of the Medical Department.

Medical Maintenance in Hospitals

Medical installations and activities before World War II were virtually autonomous from a medical equipment maintenance viewpoint. Some central direction and guidance were provided, mainly in the form of monitoring and approving expenditures for commercial contract maintenance, or procuring and installing new equipment. Station maintenance, however, was generally left to the discretion of the post surgeon.

In the typical post or station hospital of 1939–40, medical maintenance was a function of medical supply, but there was no medical maintenance shop in the supply organization. On-post ordnance, engineer, and signal shops were used to perform most common maintenance chores. This encompassed repairing or replacing valves, thermostats, and gaskets on sterilizers; repairing or overhauling small electric motors; overhauling motor armatures; repairing heat lamps and other physiotherapy electromechanical apparatus.

Repair of such highly technical items of equipment as X-ray, electrocardiograph, and other machines was accomplished either on manufacturer's guarantee contract or by separate service call of the manufacturer's representatives. Hospitals located in large metropolitan areas enjoyed particular advantages in satisfying this aspect of the maintenance requirement. Because of the delicate nature of the machinery then in use, frequent repair and adjustment were necessary.

This organization was, for the most part, satisfactory for types of maintenance described. There was a decided gap, however, in the support structure involving the area falling between those simple maintenance operations that the user might perform for himself and those amenable to common shopwork. Included were such chores as replacing knobs and gages on sterilizers, replacing elements in heat lamps, replacing sockets and plugs on bedlamps, replacing knobs on bedside tables, and a host of other tasks outside the area of user

maintenance, but not sufficiently technical to arouse a ready response from the post shops or manufacturers' maintenance facilities. The medical supply activities in prewar Army hospitals solved this problem in various and sundry ways. At Fort Banks, Mass., for example, a handyman was assigned to the medical supply activity. If nothing else, the handyman could determine which items required the more skilled services of the post shops or manufacturers' facilities. He could also do many jobs that required nothing more than a screwdriver, a wrench, or a pair of pliers.

Thus, the medical maintenance problem was kept within manageable limits. User maintenance was not identified, defined, or promoted; it was practiced only when the individual user was motivated to do so by his superiors. Preventive maintenance was not part of the structure. Even the handyman, although perhaps serving the purpose of preventive maintenance to a limited extent, was not utilized with this object in mind.

As war approached, maintenance problems were swiftly inflated. The draft took its toll of commercial medical equipment servicemen while existing medical installations were expanding and new ones were being rapidly established across the country. Pending a centralized program complemented by a source of trained medical repairmen, each medical installation continued largely on its own to establish and expand shop capabilities, staffing and equipping from local resources. Because of the paucity of medical supplies and equipment during 1942, many hospital commanders pointed with pride to their maintenance programs. These programs often included replating and resharpening surgical instruments, sharpening dental burs, and repairing and maintaining equipment. A substantial portion of the program was being effected within the hospital medical supply operation. The ability to accomplish it depended upon the presence of skilled personnel. Otherwise, it was accomplished under local contracts.

Development of the Maintenance Shop

The location of major medical equipment repair facilities in selected supply depots was a natural development that facilitated serving maintenance needs of Army hospitals. Such a shop was located at the New York Zone Intermediate Depot at the close of World War I. Concern was expressed over who was to control the repair facility. In response to an inquiry on the matter, The Surgeon General, in a letter to The Quartermaster General on 11 July 1919, wrote, "It is believed to be better policy (than having another service like Quartermaster or Ordnance responsible) to have a central repair establishment in the Medical Department to which surgical instruments and delicate laboratory equipment can be sent for repairs." [1]

Amidst this uncertainty of control, the procedure was established that all repair and return requests from military infirmaries and hospitals would be

[1] Letter. The Surgeon General to Chief, Storage and Issue Branch, Storage and Traffic Division [Office of The Quartermaster General] (attention: Col. R. B. McBride), 11 July 1919, subject: Repair and Salvage of Equipment.

processed through the Surgeon General's Office and, in turn, through the Quartermaster General's Office before action by the repair facility of the New York Depot. About this time (the early 1920's), officers on field visits reported observing "deplorable conditions" insofar as hospital furniture and equipment were concerned. These combined factors undoubtedly influenced the decision to establish a maintenance shop at the St. Louis Medical Depot, St. Louis, Mo., under control of The Surgeon General.

The St. Louis shop was established in July 1922 on one floor of a building on the old Arsenal Reservation. Both wooden and metal equipment were repaired, and by the shop's fourth year of operation, the value of processed equipment totaled about $14,000 yearly. Although significant at the time, this approximated the value of one 200-ma. X-ray unit processed in the shop during World War II.

Personnel of the Civilian Conservation Corps and the Public Works Administration were added to the shop in 1938. By January 1942, the facility had been moved to what was known as the Indian Warehouse in the business district of St. Louis and had a staff of 26 persons.

Program and Organization

By the end of 1942, the need for an organized maintenance program for the Medical Department was becoming increasingly evident. Creation of a program virtually overnight was not looked upon by anyone as an easy task. Nevertheless, in April 1943, following the lead of the ASF (Army Service Forces), The Surgeon General promulgated a policy concerning maintenance of medical equipment overseas.[2] Sixteen end items originally had been envisioned as constituting the range of equipment requiring such support, although the actual need turned out to be several times that number.

The maintenance plan followed a definite outline. Spare parts would be purchased in the United States and stored in the medical section of the Columbus Quartermaster Depot, Columbus, Ohio, where the initial issue for overseas would originate. Manuals indicating the use of spare parts and the methods by which these parts should be replaced would be compiled and used in a program of training enlisted repairmen who would be assigned to tactical medical depots upon graduation. In overseas areas, tools and spare parts would be furnished to effect proper maintenance and repair of end items. These parts would be requisitioned as required from depot installations, and repairmen would be ordered to technical installations in the combat zone. Certain items worthy of repair yet beyond the capability of local facilities would be returned through reverse supply channels to medical depots for replace-

[2] (1) Memorandum, Lt. Col. C. G. Gruber, SnC, to Acting Director, Distribution and Requirements Division, 1 June 1944, subject: Annual Report for Fiscal Year 1944, Maintenance Branch. (2) Memorandum, Col. S. B. Hays, MC, Director, Distribution and Requirements Division, to Mr. [Edward] Reynolds, 26 Jan. 1944, subject: Distribution and Requirements Division, Supply Service, Fiscal Year 1944.

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ment or repairs as indicated, and unrepairable items of a critical nature would be returned to the Zone of Interior for reclamation.

By early 1943, the Commanding General, ASF, had established a Maintenance Branch, and maintenance first emerged as an organizational entity within the Surgeon General's Office.[3] A new organization chart titled the element "Maintenance (Repair) Branch" and placed it alongside the Storage, Requirements, Issue, and Stock Control Branches, all within the Distribution and Requirements Division of the Supply Service. According to the chart, the new branch supervised "the maintenance and repair of medical equipment including the operation of repair shops under the jurisdiction of The Surgeon General" and prepared "spare parts and repair manuals." Maj. (later Lt. Col.) Louis F. Williams, PhC, was designated to serve as the first chief of the Maintenance Branch. Also, early in the medical maintenance program, Lt. Col. Charles Baumann, SnC, was assigned on temporary duty to the Maintenance Division, ASF, to effect liaison on the implementation of policies affecting medical equipment maintenance.

Following several minor organizational changes made to cope with the expanding medical maintenance activities, the Maintenance Branch was shifted on 26 July 1944 to the newly organized Storage and Maintenance Division, Supply Service, of the Surgeon General's Office. The Maintenance Branch was responsible for maintenance and repair of Medical Department equipment, including supervision of the operation of repair shops under the jurisdiction of The Surgeon General; and for preparation of spare parts lists, technical manuals, supply bulletins, and other publications relative to maintenance.[4]

At its peak in mid-1945, the Maintenance Branch had 3 officers and 8 civilians in the Surgeon General's Office, 14 officers and 16 civilians in the St. Louis field office, and 1 officer and 1 civilian in the New York field office. In late 1945, the Washington, D. C., and St. Louis elements of the Maintenance Branch were merged in St. Louis and allocated 7 officers and 10 civilians, with supervision of these activities being retained by the Chief of the Supply Service.

This organization continued until its functions either were gradually dissolved in postwar reorganization or were merged into other staff and operational elements, particularly into the Medical Technical Maintenance Division of the joint Army-Navy Medical Procurement Office.

TECHNICAL TRAINING

Success of the Medical Department maintenance program hinged on the availability of adequately trained personnel. The most demanding duty that faced Capt. Thomas P. Dunn, MAC, when he assumed directorship of the

[3] Organization Chart, Office of The Surgeon General (Distribution and Requirements Division), 11 June 1943.

[4] Annual Report, Storage and Maintenance Division, OTSG, fiscal year 1945.

Maintenance Shop, St. Louis Medical Depot, in 1943, was probably that of training a staff. Equipment technology had outdistanced the training and experience of shop personnel. Thinking first centered around using the facilities of medical equipment manufacturers to satisfy training requirements. This may have started out as a valid consideration, but it was soon doomed as impracticable. Early in 1942, quotas were obtained to place 20 enlisted men with Ritter Dental Manufacturing Co., Inc., Rochester, N. Y., for 2 weeks, but this was too limited for Medical Department needs. Factories had not the capacity, the organization, or the understanding of the Army's great variety of requirements to meet the task. Equipment density of any one manufacturer's products, at any one location in the Army, was so small that the military could ill afford to have a so-called "factory trained man" for each make of equipment in any given hospital, or supporting depot shop. Moreover, to attempt to train military personnel in selected factories in a roundrobin-type affair would have been costly, inconsistent, ineffective, and particularly time-consuming when time, most of all, was of the essence.

During the war, hospitals were equipped more extensively, and medical equipment became more complex and often of poorer quality. This poorer quality was attributed to scarcity of critical raw materials and to waivers on specifications to expedite delivery of items during the early days. These factors imposed increased maintenance demands at a time when commercial maintenance service was dwindling because of the selective service impact.

Personnel Requirements

Medical equipment manufacturers were extremely cooperative and willing to assist The Surgeon General in any way possible to establish an effective maintenance training facility. In addition to establishing courses in dental equipment maintenance, which were attended by military personnel in late 1941 and early 1942, various manufacturers furnished suggestions and advice regarding technical aspects of their particular line of equipment. Moreover, they gratuitously assigned qualified personnel from their sales and service organizations to act as civilian instructors.

The real seed was planted on 10 January 1942, when The Surgeon General authorized a 3-month maintenance training course and requested The Adjutant General to publish quotas for a school to be conducted at the St. Louis Medical Depot.[5] A quota was established of 14 students each for classes starting on 16 February, 18 May, and 17 August. Quotas were oversubscribed, and the class began with 24 students from the Corps Areas, the Army Air Forces, and War Department overhead personnel.

Opening the first class did not by any means signal full establishment of the school. Manufacturers' representatives, acting as instructors, taught sub-

[5] (1) Memorandum, Lt. Col. F. C. Tyng, MC, to Commanding Officer, St. Louis Medical Depot, 10 Jan. 1942, subject: Training of Enlisted Maintenance Men. (2) Annual Report, Medical Supply Services School, St. Louis Medical Depot, fiscal year 1943.

jects pertaining to items manufactured by their firms. Textbooks were lacking and available instructional aids, in many instances, were the personal property of factory representatives. Nevertheless, during these early days of maintenance training, visiting Medical Department officers and the Deputy Director of Training, ASF, impressed with the program and its essentiality, made favorable reports upon their return to Washington. In August 1942, the school was established on a permanent basis. Mr. John J. Russell, who as a civilian instructor from one of the manufacturers had participated in the X-ray phase of training, was commissioned Captain, MAC, and assigned to direct the training operation.

Maintenance and Repair Course

Factory-furnished instructors with generally good practical backgrounds had filled an immediate need, but a permanent staff of officer-instructors, some with engineering training, was required. All needed the "field viewpoint" as well as training in "how to teach" for few had had previous field or training experience. The problem was solved by commissioning five factory-loaned teachers, who, together with noncommissioned officers and enlisted men retained from the graduating classes, formed the nucleus of the school staff, which was eventually rounded out to an academically balanced faculty in 1943 (fig. 23).

Since no existing textbook covered the range of equipment in the training curriculum, the staff had to compile texts. To compress time to a minimum, various manufacturers were asked to furnish data on their respective items. The response was generally magnificent, and the information was compiled and printed locally in a three-volume series.

High school graduation was the primary announced prerequisite, and completion of training or substantial experience in X-ray technicianship became a sought for, but infrequently obtained, prerequisite. Information on the quotas for the course was made available to service commands and medical replacement training centers. Limited-service personnel were included in training quotas to replace general-service personnel on duty in fixed installations. Except those attending from medical replacement training centers on an unassigned basis, graduates were usually returned to their stations upon completion of the course. All other graduates were assigned to priority vacancies.

Upon graduation, each man was to receive a complete tool kit (fig. 24), which had been carefully designed for use in the field. Until these were ready, an ordnance ignition mechanics' kit was used as an interim item. Even after the prescribed kit became available, the supply was limited, and procurement difficulties on components necessitated sending the item to the graduate's duty station after he completed the course. Some kits never caught up with the men. Ultimately, to effect distribution where the planned system had failed and to compensate for it in transit losses, requisitions, based on the number of course graduates who had arrived without kits, were honored.

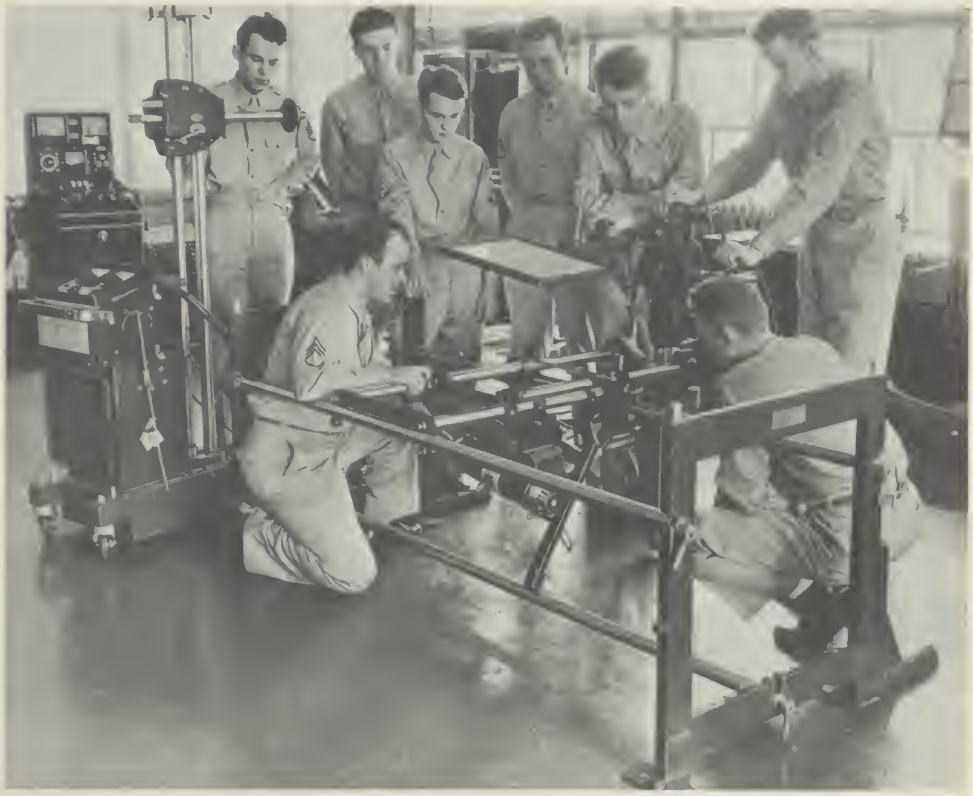

FIGURE 23.—Familiarization of students with 30-ma. Army field X-ray unit.

With continued technological developments, including more complicated circuitry and an increasing range of equipment in the supply system, the desirability of lengthening the course soon came under study. For the time being, however, The Surgeon General chose to stress quantity rather than quality to meet, to some degree, the growing need for maintenance in the field. He recommended, accordingly, that the school be enlarged to permit the training of 300 enlisted students at one time.[6] ASF approval was granted on 4 May 1943, but less than a month later, following an inspection by the Director of Training in the Surgeon General's Office, the need for lengthening the course was reconsidered. A short time later, the course was reprogramed on a 16-week schedule, which included a staggered class input at 9-week intervals.[7]

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[6] (1) AG Memorandum No. W615–37–43, 6 Apr. 1943, subject: Training of Enlisted Technicians at St. Louis Medical Depot. (2) Memorandum, Col. F. B. Wakeman, MC, to Director of Training, ASF, 23 Apr. 1943, subject: Expansion of School Facilities.

[7] Memorandum, Col. F. B. Wakeman, MC, Director, Training Division, for The Surgeon General, 28 June 1943, subject: Training Inspection of the Medical Supply Services School (Class IV), Medical Supply Depot, St. Louis, Missouri, and 2d indorsement thereto.

FIGURE 24.—Medical Department maintenance and repair tool kit.

About the same time, all courses at the St. Louis Medical Depot were grouped under one head, and the Maintenance and Repair Course became identified as part of the Medical Supply Services School. Better organization and administration resulted from this consolidation. Meanwhile, the original teaching equipment, some of which had been obtained on a special fund allocation and some from the field and classified as unfit for further use, was supplemented from depot stock to meet the expanded student loads.

An unanticipated requirement soon canceled the gain in curriculum time. In July 1943, ASF Headquarters directed that standards of military training and physical conditioning be sustained at all schools. The seventh class, starting on 10 August 1943, accordingly gave up much of its lengthened time to courses in basic military training and physical reconditioning.[8]

Officer Training

Faced with a conspicuous absence of technical know-how at the officer level, The Surgeon General in August 1943 directed that a class of 10 Medical

[8] Memorandum, Maj. N. R. Walker, AGD, Assistant Executive Officer, Military Training Division, ASF, to Chiefs of Services, 6 July 1943, subject: Concurrent Basic Military Training and Physical Conditioning in Army Service Forces Schools.

Administrative Corps second lieutenants be selected to attend the Maintenance and Repair Course. Officers, upon graduation, were assigned to MOS (military occupational specialty) 4890, Medical Equipment Maintenance Officer, and, for the most part, filled assignments in the Surgeon General's Office, staffed depot shops and liaison billets, and eventually were deployed overseas with field medical depots. Some few went directly to medical sections of theater headquarters or to other special-type assignments.

In the meantime, before the 10 officers graduated from the course, an additional 5 officers with some previous training as equipment servicemen in civilian life were assigned as medical equipment maintenance officers to the medical depots at Chicago, Ill., and St. Louis, and to the medical sections of the ASF depots at San Antonio, Tex., Savannah, Ga., and Seattle, Wash. Until officers could be made available through graduation from the course, these five officers constituted the complement of medical equipment maintenance officers in the field. Their duties included liaison with posts, camps, and stations; inspection trips; and coordination with the medical supply officers at hospitals.

With few exceptions, one common phenomenon characterized medical equipment maintenance officers. Because of the extreme shortage of enlisted maintenance personnel and of the prevailing concept of using officers as troubleshooting equipment servicemen on a regional basis, they were generally seen in fatigue uniforms inspecting, installing, repairing, or dismantling items. Commanding officers and other executives usually considered them technicians rather than supervisory directors, as compared with other officers assigned to more "dignified," although none to more important, duties.

By the end of 1943, 360 students had been enrolled for maintenance training: 210 had been graduated, 42 had failed academically, and 108 were still in training. By the end of the following year, 830 enlisted men and 56 officers had been graduated.[9] Equipped with the necessary know-how and tools, an excellent esprit de corps was evidenced among maintenance school graduates. Letters and other reports from alumni stationed in practically every area of the world usually carried some technical message relating to the maintenance situation. This information was carefully analyzed by the staff, and class schedules were revised to stress the most commonly noted phenomena. Such correspondence was encouraged by the course director, who advised graduating students of the continuing availability of the faculty to assist by correspondence when unusually perplexing service problems were encountered or when the graduate experienced any apprehension about a task at hand.

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[9] (1) History of the St. Louis Medical Depot, 7 Dec. 1942–7 Dec. 1943. (2) A Summary of the Training of Army Service Forces Medical Department Personnel, 1 July 1939–31 December 1944. [Official record.] (3) History of Maintenance of Medical Department Equipment, 14 Feb. 1946 [official record], gives 835 enlisted through 5 January 1945, and 98 officers through 29 December 1945.

SUPPORT OF USING ORGANIZATIONS

The sudden growth in station maintenance requirements while commercial support was dwindling is explained in part by the 65 percent increase in number of station and general hospitals from July 1940 to July 1941. More concretely still, in the 15 months between September 1940 and December 1941, the number of normal beds in Zone of Interior general hospitals increased from 4,925 to 15,533, and in station hospitals from 7,391 to 58,736.[10] Concurrently, medical technical items began to spread around the world. It is of little wonder that existing facilities, civilian or military, could not cope with the staggering requirements for technical medical equipment installation and maintenance.

The maintenance training program was oriented to the performance of maintenance and repair in hospitals, of both the fixed and the mobile types. Despite any backlog of items at depot shops, or the urgency of issue requirements, maintenance at the using level was of paramount and transcending importance. It was there that patients' lives could be directly jeopardized by inadequate maintenance.

Combined technical services maintenance shops being established at most stations were of little benefit to hospital commanders for anything other than maintenance of nonmedical hospital equipment. Except for the X-ray technicians' course where relatively good operator maintenance was emphasized, equipment servicing techniques were generally absent from courses for enlisted technician operators.

During the war, medical maintenance support of the operating units was derived from three sources: that inherent in the unit, in the shop, and from commercial resources. With commercial capability diminishing in the face of bounding requirements, The Surgeon General had no alternative but to become self-sustaining in the field of medical maintenance. Units were directed to make repairs within the scope of their assigned capability and local resources and to effect other repairs by shipping items to designated depot shops. In an emergency, the depot was notified, and either a replacement item was furnished immediately or depot maintenance personnel were dispatched to the unit for on-the-spot repair. The latter alternative was used more extensively as trained shop personnel became more plentiful. Scheduled periodic visits to units also proved beneficial by providing preventive maintenance as well as timely repairs, but most of these refinements became full-fledged only toward the close of the war.

Because of their complexity, items such as X-ray tubes, X-ray tube inserts, stopwatches, microscope objectives and oculars, certain electrical instruments and meters were keyed to the St. Louis Medical Depot for replacement and repair. These instructions were applicable to overseas commands only for

[10] Smith, Clarence McKittrick: The Medical Department. Hospitalization and Evacuation, Zone of Interior. U.S. Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1956, p. 24.

X-ray tubes. Where required repairs were beyond the capabilities or economical use of depot facilities, the items were shipped to the manufacturer for repair.

As maintenance requirements mounted, this total system of handling repairs and returns evolved. To illustrate, until exacting instructions were well disseminated, confusion and delay attended the repair and return method because shipping units would often fail to identify the item as "repair and return" or to indicate its defect. As a result, the item would be processed erroneously as an excess return and then placed in depot stock. Also, improper packaging resulted in breakage in transit, with resultant problems regarding responsibility occurring.

MAINTENANCE SHOP OPERATIONS

Some confusion existed as to the maintenance responsibility for items, such as electric fans and typewriters, which were not exclusively stocked by the Medical Department. On 12 May 1943, ASF assigned the maintenance of certain Medical Department items to Ordnance, Quartermaster, Engineer, and Signal Corps under provisions of a previously published ASF memorandum.[11] However, on 28 July 1943, following protests from the Surgeon General's Office, Army Service Forces withdrew the designations indicating that "no specific Medical Department equipment will be assigned to other technical services for maintenance" but that "the Medical Department, as required, could obtain services needed and available from the shops of the respective technical services" in accordance with the latest edition of the basic maintenance manual. Final disposition and replacement, in any event, would be through depot channels.

War Department Supply Bulletin 38–1–8, dated 13 May 1944, "Repair of Critical and Nonessential Items," became the "Bible" for fifth echelon repair shops in directing, from an inventory control standpoint, what to repair and what not to repair. Additionally, machine listings were compiled monthly by the Inventory Control Branch and furnished to fifth echelon repair shops.[12] Items indicated as being in short supply were given priority in shop processing as were items received from stations for "repair and return." Also, as the medical stock position improved and the backlog of maintenance requirements pyramided, the Supply Service directed that cost of repairs for the listed items would not exceed 50 percent of the value of the item after it was repaired.

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[11] (1) ASF Memorandum S850–23–43, 5 Apr. 1943, subject: Maintenance of Army Equipment. (2) War Department Technical Manual TM38–250, August 1943, Basic Maintenance Manual.

[12] Maintenance categories were defined as follows: First echelon, that degree of maintenance prescribed and performed by the user or operator of the equipment; second echelon, that degree of maintenance performed by specially trained personnel in the using organization beyond the capabilities and facilities of the first echelon; third echelon, that degree of maintenance prescribed and performed by specially trained personnel in direct support of using organizations; fourth echelon, that degree of maintenance performed by units organized as semifixed or permanent shops to serve lower echelons; fifth echelon, that degree of maintenance authorized for rebuilding major items, assemblies, parts, accessories, tools, and test equipment, usually located at a depot.

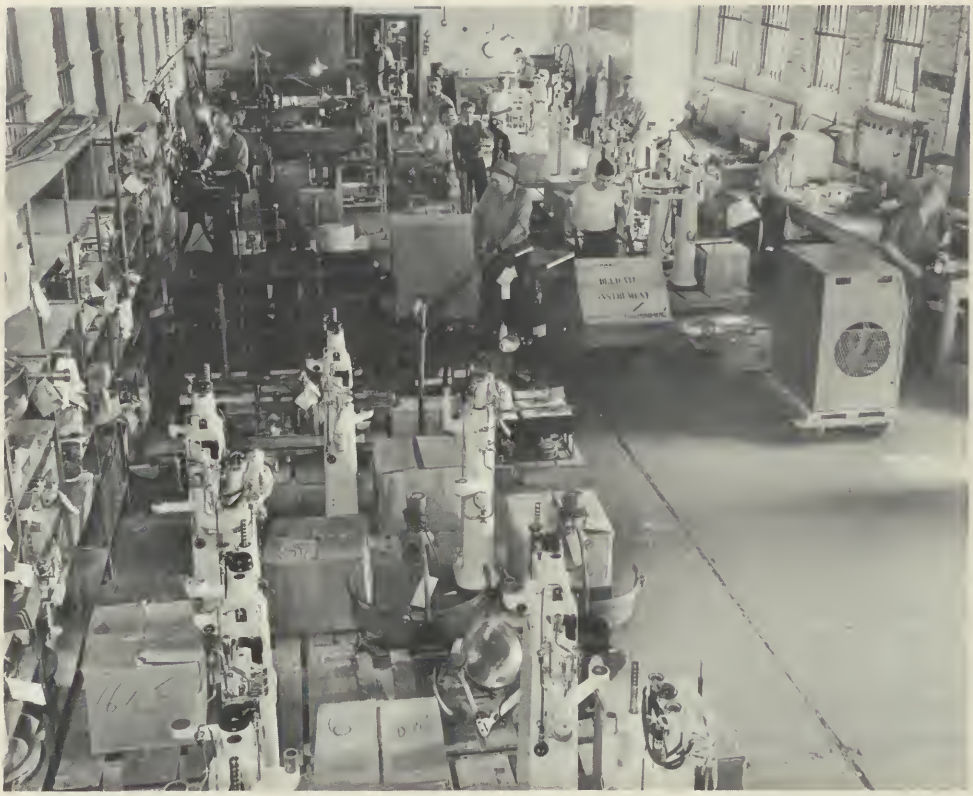

FIGURE 25.—Section of fifth echelon repair shop after relocating in Building No. 18 on the Arsenal Reservation, St. Louis, Mo.

The first formal maintenance report submitted by the St. Louis shop on 1 February 1943 indicated that equipment valued at $34,465 had been repaired and returned to the supply system in 1 month. This was about 30 times the production rate of the prewar shop. Techniques of repair which steadily improved processing time and standards were instituted. Production reached a point at which equipment worth almost $5 million was being repaired and returned to the medical supply system in a single year.

Meanwhile, because of crowded conditions and the need to place the shop in proximity to the maintenance and repair school, the decision was made in July 1943 to relocate the shop from the Indian Warehouse to Building No. 18 on the St. Louis Arsenal Reservation. By September, the move was completed. The activity operated first as the Maintenance Division repair shop and later (February 1945) as the fifth echelon repair shop, St. Louis Medical Depot (fig. 25).

As a flourishing repair activity, the shop employed 124 civilians and was administratively organized into branches and sections to delineate functional responsibilities and to facilitate equipment processing and internal coordina-

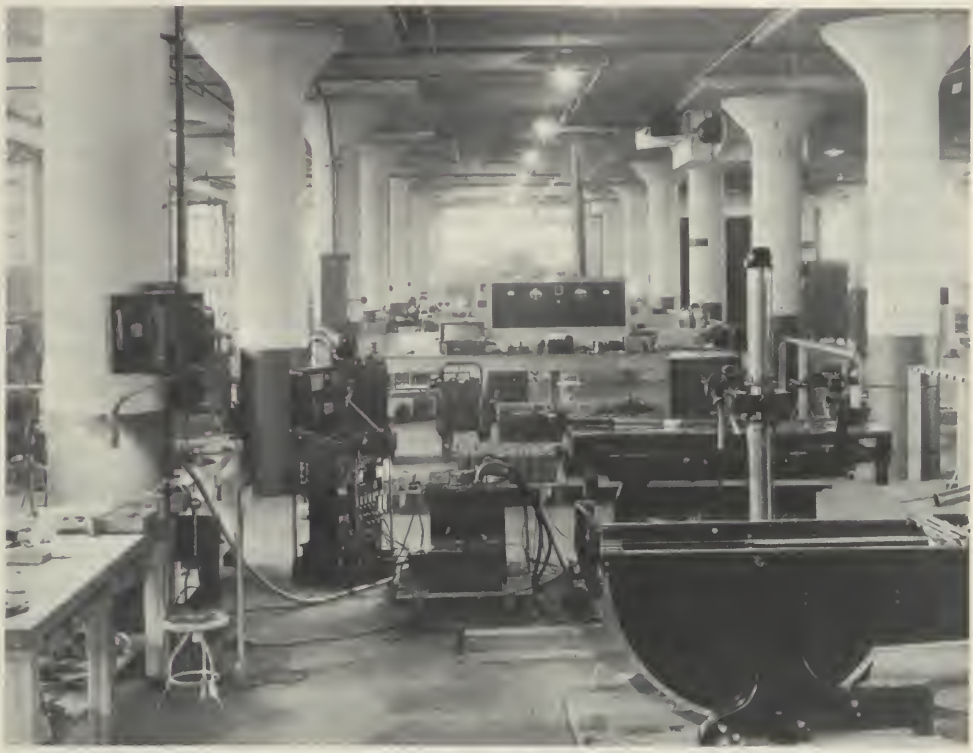

FIGURE 26.—X-ray and electrical shop in 1945 when the shop was located in Building No. 36 on the Arsenal Reservation, St. Louis, Mo.

tion. Rapidly filling its 125,000 square feet of floor space, the shop expanded beyond the physical limitations of its facilities within 2 years. In the fall of 1945, it was relocated in modern, spacious quarters on the fifth floor of the same building (fig. 26) in which two men with a handful of tools had begun to repair medical equipment in 1922.

In January 1945, a fifth echelon repair shop was opened at the Denver Medical Depot, Denver, Colo., but it was short lived. In its only full year of operation, 1945, the Denver shop, in addition to a vigorous station liaison program, repaired items with a dollar value of $1,664,816, thus relieving the St. Louis shop of a tremendous load. During the planning stages of the Denver shop, serious consideration was given to opening shops at other Zone of Interior depot locations, although it was generally accepted that the St. Louis facility could handle any foreseeable additional load.[13]

In any event, the time was right for a reappraisal, if one were to be made at all, in terms of a small-scale shop that had been organized at the Bingham-

[13] (1) Annual Report, Denver Medical Depot, 1945. (2) Memorandum, Lt. Col. R. L. Black, MSC, Director, Storage and Maintenance Division, OTSG, to Col. [Edward] Reynolds, 19 Aug. 1944, subject: Medical Department Repair Shop—St. Louis Medical Depot.

ton Medical Depot, Binghamton, N.Y., in January 1944. The problem was whether a facility, essentially the duplicate of the St. Louis shop, should blossom from the small Binghamton establishment. After further study and coordination, it was decided that the Binghamton shop should remain relatively small, and a similarly small shop should be established at the San Francisco Medical Depot, San Francisco, Calif. These two shops were phased in slowly; not until fall 1946, when some equipment was transferred from the shop then being dissolved at Denver, did they finally become fully operative. Another small shop, equipped to repair only field items and assemblage components, was established in June 1945 at the Louisville Medical Depot, Louisville, Ky. From August until the end of the year, this shop repaired more than 10,000 items valued at almost $100,000.[14]

CATALOGS AND TECHNICAL MANUALS

From the very beginning of the emergency period before World War II, spare parts—or rather, the lack of them—had plagued the maintenance program. Spare parts were regarded by some as strictly a supply problem, by others as a maintenance responsibility, with no one taking a strong position either way. In time, a semblance of a spare parts catalog emerged, and the spare parts themselves became relatively abundant, but not until relatively late in the war.

By the end of 1942, the need for spare parts was becoming more evident to The Surgeon General. In January 1943, preliminary estimates indicated that more than 200 types of medical end items were in use in theaters of operations which should have spare parts support. By March 1943, most essentials of a spare parts program were under consideration in the Surgeon General's Office.

On 5 May 1943, an Army spare parts policy was announced by The Adjutant General.[15] The policy provided that end items intended for use overseas would include specified "high mortality" parts packaged with each item, together with the concurrent procurement of 1 year's supply of spare parts, plus an additional procurement where availability would not otherwise be assured of parts for the expected life of the equipment. At least 6 months' supply of spare parts was to be shipped with the equipment. The remainder was to be requisitioned on the basis of usage rather than that of anticipated failures. Packaging was to be stressed to insure safe arrival at destination and to prevent deterioration from climatic conditions.

These were logical and well-conceived policy objectives, but they never fully materialized. Again, although this decision probably did more to foster spare parts support than any other single factor, it was too late in coming for optimum benefit in the war. Too much equipment was already in the system and too much slack had to be taken up from the 3 years of equipment influx

[14] See footnote 9(3), p. 109.

[15] AG Memorandum No. W700–23–43, 5 May 1943, subject: Procurement and Oversea Distribution of Spare Parts for Medical Equipment.

which had passed with inadequate spare parts support. Nevertheless, to make these policies effective for the time remaining, the machinery had to be put together and set into motion.

To assist in developing this portion of the growing maintenance program, Capt. (later Maj.) Eric A. Storz, MAC, was ordered to Washington on temporary duty from the Kansas City Medical Depot, Kansas City, Kans., on 17 June 1943. Numerous conferences were held, trips were made to the Army Medical Purchasing Office in New York, N. Y., for coordination, and, as a result, the Supply Service of the Surgeon General's Office issued Memorandum No. 8 on 25 May 1943. This directive focused attention of the spare parts aspects of the plan and delineated internal functional responsibilities.

By autumn 1943, planning for the maintenance program was well underway. Much had been accomplished in coordination with the Army Service Forces and the Government Printing Office as well as with other staff elements of the Surgeon General's Office, all of which inevitably became involved in the printing of any maintenance and spare parts publications. It soon became apparent that the equipment analysis essential to determining spare parts requirements could not be effected without direct access to the particular equipment involved. Thus, in September 1943, Captain Storz was ordered to St. Louis to set up the spare parts and manual program directly under The Surgeon General as well as to monitor the establishment and designation of the fifth echelon repair shops under the St. Louis Medical Depot.

Locating the maintenance publications and spare parts group at the depots adjacent to the shop and school proved to be an ideal arrangement. The school used shop facilities for some practical training, and instructors of the school were available to facilitate training of the initial shop personnel.

Assigned as a Maintenance Branch responsibility first and fundamentally was the task of reviewing Medical Department end items to identify, describe, and list the spare parts which should be cataloged in support of each item requiring maintenance in the field. Included in the program were development and revision of spare parts lists, determination of initial requirements, and establishment of distribution schedules. Primary emphasis was naturally placed on end items subject to overseas shipment.

By the time the spare parts program really got underway, an ASF catalog had been established.[16] Relating this new publication to the medical spare parts program, it was decided that the MED (Medical Supply) 7 section (organizational and higher echelon spare parts) would be issued as a series of pamphlets listing spare parts, replacement parts, special tools, and accessories, requiring frequent replacement. Further, it was desired that no publication would be made under the MED 8 section (higher echelon spare parts) since MED 7 would contain information adequate for the Medical Department. MED 9 section (list of all parts) would consist of a series of pamphlets listing all component parts of the end items. This concept contemplated that all spare

[16] ASF Circular No. 121, 17 Nov. 1943, subject: Establishment of Army Service Forces Catalogs.

parts listed in MED 7 would be stocked. Seldom used and not normally stocked spare parts, plus those included in MED 7, would be contained in MED 9.

Work previously done in preparation for spare parts cataloging was thus integrated into the MED 7 program. By November 1944, some 1,600 separate parts had been identified, and it was expected that the figure would reach nearly 4,000 when the MED 7 program was completed.

By V–J Day when publication of such documents ceased, 54 MED 7 pamphlets covering 64 end items had been prepared, of which 41 had been published and distributed. Some seven additional pamphlets were in various stages of development. No MED 9's had been published although some had been developed. To make optimum use of the work that had been done on these suspended pamphlets, The Surgeon General permitted the data to be mimeographed and issued on an informal basis as the "Spare Parts and Tool Listing."

Near the end of the war, the President's Committee on Commodity Cataloging[17] reported its findings. One major proposal was that commodity classification criteria and a uniform numbering system be adopted with central monitorship. Meanwhile, a joint medical spare parts catalog with a unique joint parts numbering system was already under active consideration by the Surgeons General of the Army and the Navy. Actually, this effort was actively implemented before final determination of action on the proposals of the President's committee. Thus, the World War II MED 7 spare parts program and the joint Army-Navy effort immediately following became springboards from which to derive a new and better postwar medical spare parts cataloging system under the auspices of the Army-Navy Medical Procurement Office.

As a corollary to the spare parts effort, certain other maintenance publications were required to promulgate technical instructions and other maintenance data to the field. A project was established to publish technical manuals covering operational aspects and maintenance requirements at the several echelons for selected technical medical items. By V–J Day, 39 such manuals had been published, and several others were in process of development. Other type publications used for dissemination of maintenance data included modification work orders, lubrication orders, supply bulletins, technical bulletins, Surgeon General's Office code letters, and port medical supply information letters. The last two items were Surgeon General administrative directives, which would be quickly published and which were convenient to distribute.

To overcome the negative pressure existing in the spare parts supply pipeline, automatic supply was carried out according to allowance lists prepared by the Maintenance Branch. As fast as procurement could be effected and delivery realized, action was initiated to distribute the initial allowance of spare parts to the several active theaters of operations. Approximately 60

[17] Established on 18 January 1945 by letter from President Franklin D. Roosevelt to Hon. Harold D. Smith, Director, Bureau of the Budget, requesting development of a U.S. standard commodity catalog.

percent of the total purchase quantities were distributed according to this scheme.

Early in the spare parts planning period, it appeared that some distinct advantages would accrue if certain spare parts were grouped and identified collectively for procurement, storage, and issue. As an example, a small assemblage of spare parts for gasoline stoves and burners was cataloged as a "kit." Such kits, normally issued with the end item for which they were designed, constituted the initial issue of high mortality spares. Kits were also available for replacement issue to the field.

Use of the kit concept for appropriate spare parts groupings had the advantage of identifying several related spare parts under a single stock number, thus facilitating recognition and handling at all levels. While kits had considerable merit, this usage admittedly resulted in some degree of waste. Often the assortment of parts in the kit did not represent a balanced supply, and one or two parts would become depleted leaving others unused. When individual parts were not readily available for issue, as was often the case, new kits were requisitioned merely to obtain the one or two needed components. This imbalance, continually corrected with experience, did not invalidate the wisdom of the kit concept for the supply of selected spare parts.

As experience with the spare parts program grew, packaging of parts became increasingly important, and attention was focused on this problem by the Army Medical Purchasing Office. Not only was packaging the critical consideration relating to protection of spare parts during storage and shipment, but it served as the primary means of identification. Faulty packaging, including illegible or poor markings by the manufacturer, was experienced. It was not until early 1945 that the Army Medical Purchasing Office could report that processing, packing, and marking problems had been worked out with the various contractors, and that spare parts were being delivered according to specifications.

MAINTENANCE ACHIEVEMENT

Proponents, planners, and others responsible for the maintenance program did not have to wait long for comments from the field. Informal reports, received by almost all conceivable means—personal contacts, telephone, personal letters, word of mouth, and informal visits—indicated more clearly than formal reports could do that the program was effective and had gained enthusiastic acceptance at all levels of Medical Department activity. The only noteworthy complaints concerned shortages of trained maintenance personnel, lack of spare parts and spare parts information, and the need for more technical publications.

The training course output never seemed to meet the demands of the field for technical personnel, and inevitably some course graduates were misassigned. Zone of Interior hospital staffs were, at first, hesitant about utilizing Army-trained enlisted men to service and repair expensive and elaborate

diagnostic and therapeutic equipment. At the outset, the fatigue uniform worn by the military repairman did not instill the same degree of confidence as did the coveralls or shop coat of a commercial representative with the name of a prominent equipment manufacturer emblazoned across the back. Similar complaints, however, were not voiced by professional and other supervisory personnel of medical units deployed in combat support operations. For them, the Army-trained maintenance personnel were vital to the success of their missions. As they became accepted, demands for course graduates steadily increased, thus compounding the shortage which was never entirely eliminated throughout the wartime period.

Spare parts and spare parts listings (MED 7's) were in great demand. Although some maldistribution of spare parts did occur, and overzealous or inexperienced planners often requisitioned more than they needed, there was a genuine shortage throughout the war at the consuming level. This was caused primarily by inadequate usage factors, by incomplete knowledge of end item density to be supported, and by the long supply pipelines which were entirely dry at the beginning. It is not surprising, therefore, that personnel in the field complained of having to use rope to replace worn out invalid chair tires, steel wool to replace brass screens in gasoline burner-vaporizers, frayed web belts to fabricate kerosene refrigerator wicks, or of having to grind delicate needle valves from welding rod stock.

The most frequent complaint about the MED 7 parts lists was that they did not cover enough end items in their range. Technical manuals and other maintenance publications were generally well received, but had started too late and were too slow in coming. Probably the most frequently heard complaint about technical manuals was that those which did become available for the most part, were received only when the recipient unit unpacked an end item and found therein the manual, which usually began with instructions on how to unpack the item.

Demobilization served to underline the need for a balanced and effective permanent maintenance program in the Medical Department. Before the end of September 1945, shop production had been cut to a 40-hour week, and personnel reductions were being experienced. Technically qualified maintenance officers and enlisted men were released from the service, and the military hospitals and depots were quickly depleted of skilled personnel. All this came during the pressure of demobilization when demands were being placed on the maintenance shops for personnel to visit and assist in closing stations. Also, demands on depots for emergency repairs were increasing at permanent stations because of the exodus of maintenance personnel from the service.

A postwar evaluation of the wartime maintenance and repair of technical medical equipment by the Medical Department showed the program as a whole to have been so successful that its peacetime continuance was recommended by The Surgeon General.[18]

[18] Letter, Col. Robert J. Carpenter, MC, Executive Officer, OTSG, to Director of Supply, Headquarters, ASF, 7 Jan. 1946, subject: Medical Department Peace Time Maintenance Program.

CHAPTER V

Storage and Distribution of Medical Supplies

PACKING AND PACKAGING PROBLEMS

When the United States entered World War II and began to ship great quantities of medical supplies to overseas theaters, no preparations had been made to meet the packing problems which soon developed. The sturdy wooden boxes which had been used in peacetime became scarce because of acute lumber shortages. Packing specifications continued to call for containers designed "in accordance with good commercial practices" or provided that the supplies "shall be packed in a manner to withstand shipment and reshipment," but interpretation of these specifications soon became more lenient. In 1942, the customary shipping containers were flimsy, open-slatted crates, thin plywood boxes for heavier items, and corrugated paper cartons and boxes for bottles, textiles, and miscellaneous items. No special efforts were made to prevent corrosion, rust, insect damage, or other ill effects of exposure to dampness, heat, and rough treatment in handling.[1]

The circumstances under which the Medical Department dispatched its supplies to overseas stations had unfortunate effects upon the weak, ill-designed packing containers. Large quantities of supplies, hurriedly assembled at overloaded ports, were stored in the holds of crowded vessels, often by inexperienced and poorly supervised stevedores. Lack of adequate harbor facilities and the exigencies of amphibious assaults frequently subjected supplies to sea water when they were unloaded on rafts or were thrown overboard and floated ashore. They might also be dropped on loading platforms, rolled, squeezed, and jostled before being jounced on trucks over shell-scarred roads. Even when delivered to the depots, there was no assurance that the supplies would be protected from further inroads of the elements, for covered storage space in the theaters of operations was far from sufficient.[2]

These storage and handling conditions which prevailed in the overseas theaters had prompt and disastrous effects upon the shipping containers which the Medical Department used throughout 1942 and part of 1943. The medical supplies and equipment were subjected to every type of damage that can be caused by rough treatment and exposure to the elements.

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[1] Record of the Processing and Packaging Conference-Exhibit, Toledo Medical Depot, 4–5 January 1945.

[2] Odenheimer, Robert K.: Report of Inspection and Investigation, Medical Department, Packing and Packaging, Southwest Pacific Area, March–April 1945.

New Packaging Techniques

Reports from the South Pacific and from North Africa resulted in prompt action. U.S. Army Specification No. 100–14A, issued late in 1942, described requirements for all types of containers, both interior and exterior, including waterproof papers, and the meager knowledge then available regarding methods of corrosion prevention. This specification corrected the most obvious and the most serious errors in export packing. During 1943, specifications were issued which eliminated fiberboard cartons as export shipping containers, standardized box construction, reduced the weight of individual boxes, and provided for the general use of waterproof case liners. These improved packing methods were adopted by manufacturers slowly and with great difficulty. By summer 1943, however, most contracts for later delivery of supplies included packing specifications which reflected Medical Department experience during the preceding 18 months. In 1944, additional and stricter specifications sought to correct packing deficiencies which still existed, particularly in the field of corrosion prevention. ASF (Army Service Forces) Manual 406, published in December 1943, was instrumental in the development and widespread use of specifications designed to protect all types of equipment subject to corrosion. A Packaging and Packing Section was established at the Army Medical Purchasing Office. This section, in addition to drafting packing specifications, maintained close contact with the manufacturers and aided in the practical application of the specifications.[3]

From the end of 1942 until the close of the war, depots assumed the main burden of the packaging problem, the repacking of supplies. Each depot relied initially upon experimentation and improvisation, but considerable progress was made in late 1943 when a Packing and Crating Unit was established in the Office of the Assistant Chief, Supply Service.[4] The unit was charged with two jobs: the writing of packing specifications and the institution of approved methods of repacking in the depots.

The manufacturers of medical supplies encountered many problems in adhering to packing specifications. In the summer of 1943, for example, the lumber shortage became more acute, adversely affecting all packing and forcing resort to substitute materials. V-board, made of superstrength all-kraft fibers, was then adopted as a substitute for wooden boxes and as a successor to corrugated fiberboard of the non-water-resistant type. This V-board made a waterproof box which was satisfactory when packed with light, closely fitting items, such as blood plasma. It was widely used, however, to contain a number of items which could not be shipped safely in such a flimsy box. Consequently, there were numerous reports from overseas, describing unsatisfactory results obtained with V-board—crushed, torn, and perforated boxes, which caused

[3] Pile, Benjamin D.: Development of Packaging and Packing in the Medical Department During the Present Emergency, 16 Oct. 1945. [Official record.]

[4] Supply Service Memorandum No. 6, 8 Mar. 1943, subject: Packing and Crating Organization.

the ruin of valuable supplies. Finally, in spring 1945, V-board was abandoned by the Medical Department, except for a restricted group of items.[5]

Serious shortages were encountered in many other types of packing materials, including steel strapping, staples, strapping equipment, waterproof case liners, waterproof cement, cellophane bags, chipboard, and foil barrier materials. Some shortages, caused by ineptly worded specifications, should have been corrected promptly, but most were caused by scarcities in basic materials and manpower. Often, the Medical Department hastened the completion of a contract by using its influence to obtain higher preference ratings for the required packing materials.

The two problems which appeared to be the most serious and immediate were breakage in overseas shipments and damage by water. Supply officers in the depots applied themselves to the solution of these problems. Considerable progress was made in solving the breakage problem by the construction of sawed-board, nailed, metal-strapped boxes; the use of adequate bracing and blocks in packing equipment such as X-ray machines, sterilizers, and operating lamps; placing a maximum load-limit on the contents of shipping containers; and the lavish use of ground cork, excelsior, and other cushioning materials.

Shortages of packing materials and the press of work were attacked by preference ratings to the suppliers of packing materials, the employment of additional civilian personnel, and the introduction of assembly line procedures in the packing rooms.[6]

In devising methods of waterproof packing, the depots soon made distinguished progress. Waterproof case liners, made of asphalt-base laminated materials, were adopted for all boxes intended for export shipping. The case liner was first arranged in the box; then, the supplies were carefully packed in the liner; and, finally, the liner was sealed, and the box was nailed and strapped. This produced a shipping container that admitted no water, even when immersed. However, additional precautions were frequently taken. Cement-coated, rustproof nails were used in the construction of the boxes. Waterproof labels and markings were used on the exterior. In packing electrical equipment, a vaporproof barrier and a desiccant included within the package were used to exclude moisture from delicate contact points (fig. 27.).[7] For expendable supplies, this method was satisfactory. Overseas installations received the boxes and opened them as the supplies were needed. When the tactical situation required a move, only a small quantity of unpacked supplies had to be dealt with. Nonexpendable supplies and equipment, on the other hand, had to be repacked, and few mobile units had either skilled labor or packing materials to provide waterproof containers. The Supply Service

[5] See footnote 3, p. 120.

[6] See footnote 1, p. 119.

[7] Memorandum, Capt. Paul Lipman, MAC, Asst. Purchasing and Contract Officer, to Lt. Col. E. A. Shea, MAC, Chief, Purchasing Division No. 4, AMPO, 31 May 1945, subject: Annual Report for Fiscal Year 1945.

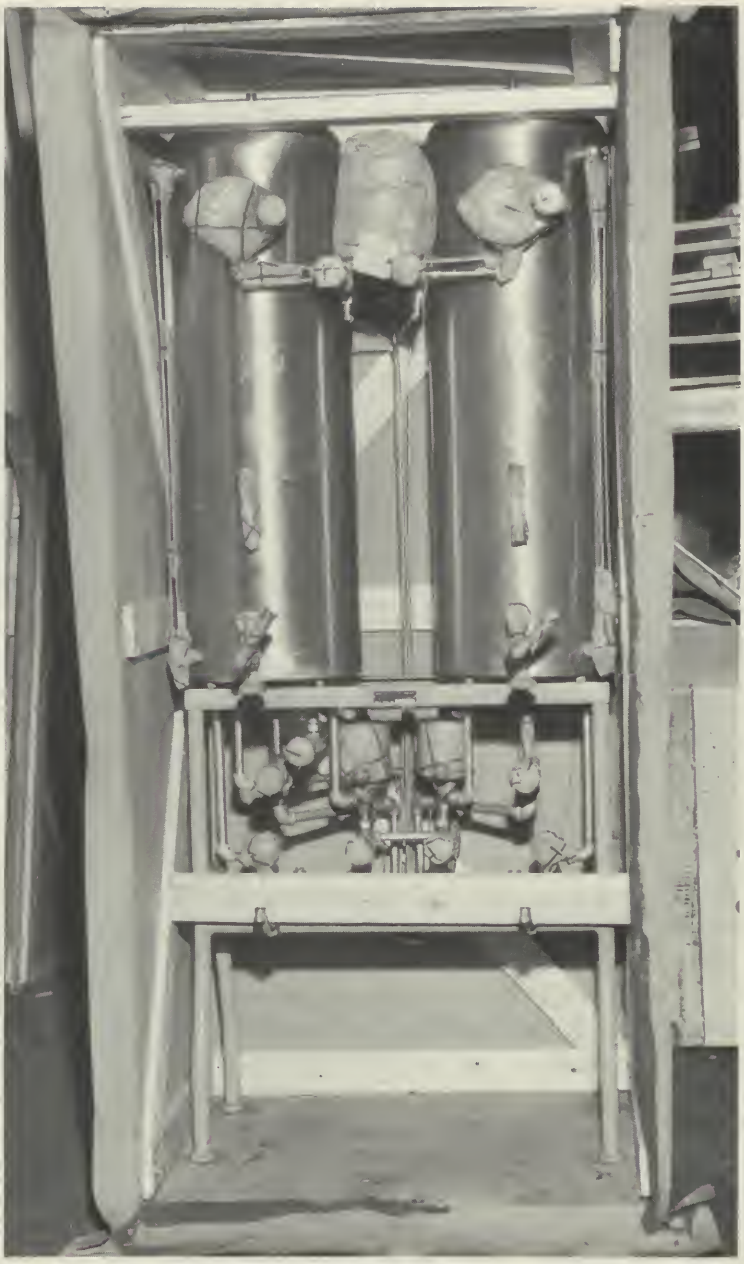

FIGURE 27.—One of many packaging problems of the Medical Department was to provide adequate protection for tubes and gages on sterilizers. Toledo Medical Depot, Toledo, Ohio, December 1943.

developed the "amphibious box" to meet this particular need. The box, when fully packed, could sustain a drop of 15 feet without loosening the watertight gaskets. This container proved to be invaluable in the functional packing of field installations for supplies and equipment could be quickly repacked when the unit moved. While the unit was in operation, the tops were removed and the boxes stacked on their sides, thus providing tiers of shelves for the storage and issue of supplies. The amphibious box was a relatively expensive item, costing the Medical Department $16 each, but its usefulness was so great that more than 72,000 were purchased.[8]

Scarcity of material forced depots to procure high grade lumber for overpacking; for example, shipments processed by the depot at San Francisco, Calif., contained high grade redwood. Although this was inconsistent with the prevailing policy, recipients of medical supplies in the Pacific were highly pleased, as shipments were received intact and the lumber was used to good advantage in fabricating hospital furniture, floors, and similar items not otherwise available.

Preservation of Instruments

Soon after heavy overseas shipments began in 1942, it became apparent that one of the most serious problems would be the protection of surgical instruments (fig. 28) from corrosion. Numerous reports from theaters of operations called attention to instruments which had corroded so badly that they were useless. At first, transportation and storage conditions overseas were blamed for this deterioration in the instruments, and efforts were redoubled to pack them in moistureproof containers; but depot inspections revealed that surgical instruments in stock were imperfectly protected. Moisture in the air industrial fumes, dirt, and even perspiration traces left by handlers caused corrosion. It was discovered, also, that many box-lock instruments were corroding in the locks, a condition caused by a scale formation.[9]

One solution of this corrosion problem involved a thorough processing of the instruments in the following manner: The instruments were placed in a metal basket and lowered into a tank filled with stoddard solvent, which removed dirt, grease, and other organic residue. A second tank, filled with the same solvent, provided a rinse. Next, the instruments were immersed in a third tank which was filled with specialized solvent, a fingerprint neutralizer. After draining, the instruments were placed in a drying oven heated by infrared lamps. The dry instruments were removed from the oven, allowed to cool for 2 or 3 minutes, and dipped into a preserving tank containing an oil or grease which was especially adapted to the items being processed. Finally, they were sealed in laminated foil bags, and were then ready for storage. Zone of Interior issue, or overseas shipment.[10]

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[8] The Amphibious Box. Bull. U.S. Army M. Dept. 4 : 424, October 1945.
[9] Shea, Elmer A.: Surgical Instruments. [Official record.]
[10] See footnote 9, above.

FIGURE 28.—Sample board used as guide to identify medical instruments processed and packed in assemblies. Medical Section, Atlanta Quartermaster Depot, Atlanta, Ga., January 1943.

In 1943, orders were issued to process all surgical, dental, and veterinary instruments, but precise specifications as to how this was to be done were not laid down. The results were so generally unsatisfactory as to demonstrate the need for a technique that would be at once simple and effective. After considerable experimentation, an electrochemical process was devised and made standard in time to be widely used during the latter part of 1944. The instruments were thoroughly cleaned, immersed in a light oil, wrapped tightly in nearly pure aluminum foil, and finally were packaged in metal-lined, heat-sealed envelopes. The process gave adequate protection against all the well-known causes of corrosion and the little-known cause of scale formation. Instruments thus processed and packaged were safe from corrosion for extended periods of time and under all conditions. In addition, they were ready for use after the envelope was opened, the foil wrapper removed, and the instruments sterilized. This ended the time-consuming removal of heavy greases, wax, and resin coatings, with which instruments formerly had been protected.[11]

It was intended that all processing of instruments would be done at the medical depots at St. Louis, Mo., and Kansas City, Kans., but the shortage of personnel made it expedient to engage a private contractor in St. Louis. The purchasing office in New York prepared lists of instruments to be processed, grouping them according to patterns. Instructions were then issued to the various Medical Department depots, requiring them to ship approximately 100,000 per week to the St. Louis depot. This depot released the instruments to the contractor on an established schedule; and after the instruments were processed, they were placed in the St. Louis depot stock. This program began in the fall of 1944. By 30 November 1944, approximately 1,250,000 instruments had been processed, and during succeeding months, nearly 2 million more were given this protection against corrosion.[12]

Unfortunately, this new process was developed too late to be of great practical benefit in World War II. The heaviest shipments of surgical instruments to overseas installations were made during 1943 and 1944; consequently, only small quantities of instruments protected by the new process were sent abroad before the end of the war.

Results of Research and Development

The Medical Department's experience with the protection of surgical instruments clearly demonstrated that the entire packing and packaging program in the depots should be subjected to central control. At the beginning of the war, the depot commanders were allowed to operate without interference in the handling of outgoing shipments. This encouraged ingenuity and local initiative, which produced many important advances in packing techniques.

[11] Hornbacher, Arthur: Surgical Instruments: Difficulties Due to Corrosion and Methods Taken to Combat Them. [Official record.]

[12] See footnote 11, above.

Unfortunately, this system also had the disadvantages usually associated with local independence. Some depot commanders, possessing imagination and energy, applied themselves to the task of adapting their packing methods to wartime conditions; but others were slow to change their methods even though the need for haste was the theme of all reports received from overseas. Depot inspections could not correct these deficiencies; by the time the inspections were made, much of the damage had been done, and poorly packed supplies were deteriorating in every theater.

Packing methods which were developed in the depots, and the advances which research produced, were standardized by the Medical Department for use in all depots. Precise packing specifications were prepared, which described the materials and methods to use in packing the more important and easily damaged medical items. Manuals were published and directives were issued. Training films were made and exhibited to the appropriate personnel of all depots. At packing and packaging conferences (at Toledo, Ohio, St. Louis, and New York, N. Y.), attended by supply officers from the various depots, new processes were explained and enthusiasm for better work was generated. In other words, strong and continuous efforts were made to develop and maintain an "export consciousness," to instill the belief that supplies must be so packed that they would be usable to combat areas. The extent to which this attitude was built up is indicated by the remark of a depot commander in 1945, who declared that he "would not quibble about spending $50 to insure the arrival of a single package of blood plasma to the battle front in good condition." To enforce the directives and to assess the value of this widespread training program, inspecting officers from ASF Headquarters and from the Supply Service of the Surgeon General's Office, made frequent visits to the packing rooms of the depots. These manifold efforts bore a rich harvest. By spring 1945, the Medical Department was reported to have climbed from the bottom rung of the ladder to a place near the top, in comparison with other technical services, in the protection and packing of supplies.[13]

This judgment, rendered by inspecting officials in the the Zone of Interior, was confirmed by reports from overseas. Supply officers in the Southwest Pacific declared that the supplies received during the period from 1 July 1944 to 1 April 1945 showed a "100 per cent improvement" in packing. The waterproof case liners and the nailed wooden boxes were hailed as the most satisfactory packing materials used. The only persistent and important complaints received from this area in 1945 were that fragile items should be more carefully cushioned and that large pieces of equipment with projecting parts should be disassembled before shipment.[14]

By the spring of 1945, all the more serious packing and packaging problems had been solved. The early and laborious efforts of the depots, the research and experimentation in the laboratories, and the developments in manufacturers' plants culminated in a series of joint Army-Navy packing specifica-

[13] See footnotes 1 and 2, p. 119.
[14] See footnote 2, p. 119.

tions, which replaced the ASF Manual 406 and a multitude of tentative specifications. The Joint Army-Navy Packaging Board, established in 1945, coordinated the work of subsidiary groups and issued specifications to all branches of the Armed Forces. The work of the Packaging and Packing Section, Army Medical Purchasing Office, resulted in the preparation of a "Master Preservation Packaging and Packing Listing," which described in detail a method of processing and packing for every item of the Medical Department catalog.[15] If an invasion of Japan had been necessary, the medical supplies thrown upon the shores of that country would have shown the great improvements in packing techniques which had been achieved since the landings on Guadalcanal.

STORAGE OF MEDICAL SUPPLIES

The functions of storage and distribution are closely linked in many ways. For a large part of the war, they were supervised by a single division of the Supply Service, and throughout the conflict both were carried out by the Medical Department's farflung depot system. But, however linked they were, the functions of storage and distribution were essentially different. In the purposes they were intended to accomplish and in the problems encountered, they found little in common.

Increased Depot Activities

At the outset of World War II, the Medical Department was responsible for procurement, storage, and issue of approximately 4,500 items. By 1942, the number of items under medical cognizance had jumped to 6,000, and another 1,000 items were added by 1943. During mid-1942, some 700 contractors were serving the Medical Department, but within a year's time, this had jumped to 2,500 contractors and the number of contracts had reached 25,000.[16]

Furthermore, until early 1944, contracts were F.O.B. destination, which meant that items received from contractors could not be picked up on stock records and made available for issue until they were formally accepted. Some deliveries from procurement to depots were piecemeal, delayed, lost, or damaged in transit. Often, stocks arrived before receipt of specifications or copies of the contracts. These documents were necessary to permit identification, inspection, and acceptance. In the event of deficiencies, stocks upon arrival had to be segregated and withheld from issue pending acceptance, or refusal and disposition instructions.

Aggregating more than 5.4 million square feet by July 1941, medical supply depot space continued to expand after entry of the United States into the war. A new branch depot was established in Kansas City, with Lt. Col. Revel E. Hewitt, MC, as commanding officer; and medical sections were added in general depots at Seattle, Wash., Atlanta, Ga., and Richmond, Va., so that in

[15] See footnote 3, p. 120.

[16] (1) Annual Report, Finance and Supply Services, OTSG, fiscal year 1942, and attachment "Office diary." (2) Annual Report, Supply Service, OTSG, fiscal year 1943.

July 1942, the space available amounted to 7 million square feet. Additional space acquisitions increased storage facilities still further during the next 6 months; in July 1943, the peak of 13 million square feet was reached. From this time until the end of the war, the trend was reversed. Space in depots and medical sections was sharply reduced, and a number of installations were inactivated as the demand for storage area was diminished. Twenty depots and medical sections had been occupied in July 1943. This number dropped to 17 in July 1944, and to 14 in July 1945. During the same period, the number of square feet occupied fell to 10,348,000 in 1944, and to 9,127,000 in 1945.[17]

The number of military and civilian personnel employed in the depots showed a steady climb to the middle of 1943 and a similar reduction after that year. A few months before Pearl Harbor, fewer than a score of trained supply officers were available for depot operations. This meager pool of military personnel was supplemented by granting commissions to individuals with appropriate civilian experience, calling to active duty a number who held Reserve commissions in the Medical Administrative Corps and the Sanitary Corps, and by training newly commissioned graduates of the Medical Administrative Corps officer candidate schools. These young officers, directly after receiving their commissions, entered upon a period of supply training. The number of officers on duty in the depots increased from 171 in December 1941 to 465 in December 1942, and to 511 in June 1943.[18]

Despite difficult problems in recruitment, including a relatively low salary scale, the number of civilian employees increased at an impressive rate (fig. 29). When the United States entered the war, there were approximately 2,600 civilian employees in medical depots. This number was increased to 5,700 in July 1942, and to 14,100 in July 1943. As in storage space, this was the peak period. Employment declined to approximately 9,400 in July 1944, and 6,800 in July 1945.[19] It should not be assumed, however, that this decrease in civilian personnel indicated a diminution of activity in the depots. Quite the contrary is true, for the workload of the depots showed a distinct increase during the latter part of the war. This striking conservation of manpower was made possible by the decrease in storage space, by the increased use of materials-handling equipment, by work simplification, and by better training and control of employees.

Operation of the Depot System

Medical depots were able to survive the onslaught of work and confusion that flashed into being during the first years of the emergency and war. By June 1943, they were beginning to reap the gains of experience. From then

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[17] (1) See footnote 16, p. 127. (2) Annual Report, Storage and Maintenance Division, OTSG, fiscal year 1945.

[18] (1) See footnote 16(2), p. 127. (2) Report on Administrative Developments, Office of The Surgeon General, 1 Dec. 1942. [Official record.]

[19] (1) See footnotes 16(1), p. 127, and 17(2), above. (2) Memorandum, The Surgeon General for the Commanding General, ASF, 29 June 1945, subject: Report, Pursuant to Directive of 1 June 1945, Submitting Additional Material for Annual Report of ASF.

FIGURE 29.—Window showing job openings at San Francisco Medical Depot, San Francisco, Calif.

on, even increased demands placed on depots seemed more reasonable in view of their extended capabilities, thus swelling their production without an increase in manpower.

In December 1941, however, the depot system itself was rudimentary, with specialization only just begun. The medical sections at New York, San Antonio, Tex., and San Francisco, Calif., distributed stocks to their respective distribution areas and to ports of embarkation, while the branch depots at St. Louis and Savannah, Ga., performed similar functions. The medical sections at Schenectady, N.Y., Columbus, Ohio, and New Cumberland, Pa., were used for storage of the War Reserve. The branch depot at Toledo constructed hospital assemblies. This was the full extent of specialization, but wartime demands soon proved too heavy for the existing framework.

One of the earliest difficulties arose from the scarcity of certain items. The old system under which stocks had been divided more or less impartially among the depots left no facility with sufficient scarce items to satisfy its needs. The solution was the "key depot system" set up in 1942. In each of three

main geographical regions, one depot was designated to receive and store stocks of these items.[20]

By summer 1943, the depot system was substantially in final form. Storage facilities were divided then into five categories, each with its specialized function—distribution depots, assembly depots, port filler depots, reserve depots, and holding and reconsignment points. In each category, the depot type determined to considerable degree the variety and quantity of medical supplies sent to it.

Depot administrative organization, originally conditioned by local needs and the wishes of individual commanders, was brought into conformity with a general pattern in 1943, the pattern being laid down by the Storage Division, ASF. The basic divisions were Administration, Transportation, Stock Control, Personnel, and Storage.[21] The storage divisions were usually composed of Inventory, Storekeeping, and Labor and Equipment Pool Branches, and required the largest number of military and civilian supervisors because of the variety of functions for which they were responsible. Receiving and inspection were the first duties of the Storage Division. Inspection extended to quantity, condition, and packaging, but not to actual testing for conformity to specifications of drugs, chemicals, and biologicals. This latter function was performed by the Army Medical Purchasing Office and the U.S. Food and Drug Administration.

Movement of supplies within the individual depots was often severely handicapped by poor elevators. The construction of single floor warehouses by the Army helped solve this problem.

Before the war, medical supplies were stored, to a great extent, in "item sequence"—that is, all quantities of each item were stored in one place and, so far as practicable, all item numbers were stored adjacently and in sequence. The huge procurement program of 1942–43 forced expansion in depots, and item sequence storage could be maintained only by building bigger warehouses and rewarehousing. Because of this complication, most depots which were activated in 1941 and 1942 never employed the item sequence method, and those which antedated the war were compelled to abandon this method. Under the new system, the location of each medical item was determined by the amount of storage space it required, appropriate storage conditions (such as load limits on floors), and the speed with which the item was used or requisitioned. The experience of the Toledo Medical Depot suggested that fast-moving items, such as beds and mattresses, should be stored on the first floor. Slower-moving items and bulky hospital equipment and supplies should be placed on the top floors, while surgical dressings, instruments, laboratory equipment, dental equipment, and X-ray equipment should be stored near the packing room.[22]

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[20] (1) See footnotes 16(1), p. 127; and 18(2), p. 128. (2) Hangen, Herman C.: Key Depot System, *in* Program of Port and Assembly Depot Conference, SGO, 22 Jan. 1943.

[21] History and Procedure Manual, Toledo Medical Depot, 1941–1945. [Official record.] Some of the larger depots (for example, the St. Louis Medical Depot) established additional divisions.

[22] See footnote 21, above.

When the item sequence method of storage was abandoned, or when a new depot was established which did not employ it, a card locator system was absolutely essential. At first, in most depots, the cards for all items were assembled at one place, so that through an examination of the cards in one centralized unit, the selectors could determine the location of the stock on every floor of all warehouses. In the early summer of 1944, a decentralized stock locator system was established in all depots, remaining in effect until the end of the war. This system established a small locator unit on each warehouse floor. A locator card for each item stored on that floor showed: (1) the location, (2) number of original packages, (3) number of units in each original package, and (4) the condition of the packing. This new method increased the efficiency of the stock selectors and, at the same time, provided sufficient information for depot stock records.[23]

Need for Periodic Inventories

In October 1942, the Surgeon General's Office directed the medical depots to make a physical inventory of all stock in storage and to reconcile the balances on the stock records with the actual physical count. In addition, this directive required that each accountable item be inventoried at least every 6 months. Thus originated the "cycle inventory," which continued throughout the war and which acted as a continuous corrective of the stock records. A Cycle Inventory Branch was established in each depot, and an inventory schedule was developed which made possible the count of each item every 6 months. Additional inventories were made upon special requests. These regular and special inventories provided valuable information for both the storage and stock control officers.

At the same time, a simplified inventory adjustment procedure giving greater latitude to post, camp, and station commanders was substituted for the rigid property accountability of the peacetime army.[24]

Another matter, more directly connected with storage functions of depots, was the layout of storage areas in the warehouses. All floors were divided into sections and designated by letter of the alphabet. Many factors, such as local conditions, floor space, and volume of supplies, determined the size of the sections. These sections, in turn divided into bays by supporting columns, were numbered consecutively. The number of aisles varied and the height to which supplies were stacked depended upon the load limit of the floor, the location of the sprinkler system, and the type of supplies stored.

Use of Materials-Handling Equipment

When the heavy procurement program of 1942 and 1943 began to fill the depots with unprecedented quantities of supplies and equipment, the increased

[23] (1) History of the St. Louis Medical Depot, 7 Dec. 1943–7 Dec. 1944. [Official record.] (2) See footnote 21, p. 130.

[24] (1) See footnote 23, above. (2) War Department Circular No. 101, 12 Apr. 1943, Section IV: Simplified Inventory Adjustment Procedure (AR 35–6640).

workload rendered materials-handling equipment necessary, and the abundance of funds made its acquisition possible. Forklift trucks, tractors, and trailers became standard equipment in the depots for moving and storing nearly all supplies. The widespread use of this equipment was rendered more practicable by the adoption of a simple but ingenious aid—the wooden pallet. Supplies were unloaded on pallets at the receiving platforms and were then moved by trailers or forklift trucks to the inspection area. Still remaining on the pallets, the supplies were tallied-in, inspected, and conveyed to the storage area, where they were stacked by forklift trucks. Under the new system, the fork of the forklift trucks was inserted into the pallet, and a large number of original boxes were thus moved and stacked by a single operation. Stacks in the warehouses could be erected to greater heights, with a consequent saving of space, because the pallets provided both secure platforms upon which to store the supplies and open spaces for free circulation of air. After supplies were unloaded from freight cars and placed on pallets, they received no more manual handling until they were withdrawn for shipment (fig. 30).[25]

Work Measurement System

During the last 18 months of the war, another factor made important contributions to the efficient operation of the Medical Department depot. Early in 1944, a "work measurement system" was installed, which involved a close study of each piece of work performed in a depot. Records were maintained on the methods employed in performing each task and on the amount of time and personnel required. By comparing records of the various depots, supervising officers of the Surgeon General's Office could discover weak spots in the operation of a depot and could point out, with great particularity, the specific tasks which were being inefficiently performed. Better methods which had been devised and adopted by other depots could be introduced wherever they were needed, with a consequent saving in time, personnel, and materials. At regular intervals, the records of the work measurement system were brought to the attention of all depots, so that each could determine its efficiency in comparison with the others. This produced a spirit of competition and rivalry among the depots which still further increased their efficiency.[26]

DISTRIBUTION OF MEDICAL SUPPLIES TO ZONE OF INTERIOR INSTALLATIONS

The nature of the war which the United States entered in 1941 made it clear that in the Zone of Interior there would be two major requirements for large quantities of medical supplies. One concerned the training of more than

[25] The extent to which materials-handling equipment was used is indicated by the fact that at the St. Louis Medical Depot, the number of forklift trucks increased from 7 in 1942 to 29 in 1943 and to 40 in 1944. Pallets, which were not used in 1942, increased to 23,390 in 1943 and to 51,250 in 1944. See History of the St. Louis Medical Depot, 1941–1944. [Official record.] See also footnote 21, p. 130.

[26] See footnote 17(2), p. 128.

FIGURE 30.—Use of pallets in warehouses.

10 million men and women of the Army. The great variety of medical care and the large number of troops involved made inevitable the need for immense quantities of supplies. The second requirement was the provision of supplies for the named general hospitals, which provided definitive treatment for all American soldiers and especially for those evacuated from theaters of operations. These general hospitals were the fifth and final echelon of medical support; and, as such, they required the most elaborate equipment and a steady stream of supplies.

On each major Army installation, a medical supply officer was responsible for receipt, storage, and issue of all medical supplies. This officer sent periodic requisitions to his distribution depot, stored the supplies as they arrived, and filled the requisitions of the station hospitals, dispensaries, and other medical units on the post. Before January 1942, all requisitions from posts, camps, and hospitals were first edited by the corps area surgeons, who compared the requisitions with appropriate allowance tables and stock levels. If supplies in excess of the allowances were requisitioned or if nonstandard medical equipment was required, the corps area surgeon obtained the approval of The Sur-

geon General before forwarding the requisition to the distribution depot. The final step in this supply chain was the medical depot which handled the inspection, storage, and distribution by requisition of medical supplies to the training camps and general hospitals.

Use of Medical Unit Assemblies

Large quantities of medical supplies were issued in the form of unit assemblies. All the supplies and equipment needed to establish a medical unit (whether a 50-bed station hospital or a 1,000-bed general hospital) were assembled, packed together, and clearly labeled. When supplies for a particular medical unit were requisitioned, the depot simply added the deteriorating items and shipped a unit which had been previously assembled and packed. Although there were unanticipated difficulties, the advantages of the unit assembly as a vehicle for issuing supplies were so pronounced that it continued to be used throughout World War II. The assemblies were especially valuable in the activation of station hospitals in Zone of Interior posts. As new training camps sprang up all over the country, station hospitals opened rapidly. Many hospitals were commanded and manned by Reserve officers and Army of the United States officers who were unacquainted with tables of equipment and could not anticipate their supply needs. Time was saved and efficiency was advanced by the system which made it possible for them to requisition a station hospital, a regimental dispensary, or any other appropriate unit. When the depot system expanded with mobilization, the St. Louis Medical Depot, commanded by Col. Royal K. Stacey, MC, was responsible for construction of assemblies; and until 1943, this depot devoted a large part of its space and personnel to the assembly program. Assembly depots were also located at Toledo (hospitals); Atlanta (hospitals); Kansas City (kits and chests); and Columbus (civilian aid program).[27]

In the construction of a hospital assembly, much "paperwork" was required. The basic equipment list, of the items and the quantities of each to be included in the assembly, was reproduced on punched cards in the electrical accounting machine section, and then run through the machine to determine if sufficient stock was on hand to construct the assembly. In 1941–42, while the procurement program was getting underway, stock was extremely short. Consequently, the first "run" of the cards usually accounted for only 60 to 70 percent of the items needed. When speed was essential, the assemblies were shipped incomplete, and the receiving agencies were authorized to requisition the missing items at a later time. During this early period, the shortage of "housekeeping" items created an especially difficult problem in Zone of Interior medical installations.[28]

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[27] (1) History of the St. Louis Medical Depot, 7 Dec. 1941–7 Dec. 1942. (2) See footnote 16(2), p. 127.

[28] Memorandum, Lt. Col. R. L. Black, MSC, to The Historical Division, SGO, 16 Nov. 1944, subject: Supply Depot Historical Highlights.

Many medical items were in chronically short supply until summer 1943, necessitating back orders and extracts to other depots. The delays thus occasioned in constructing the assemblies still further aggravated the scarcities; supplies available when the first accounting machine run was made were obligated and, consequently, could not be used for any other purpose. The result was that, for periods as long as 6 months, scarce supplies lay unused in the depots, because they were being held to build assemblies. Requisitions to other services were necessary, and these requisitions also frequently resulted in an almost interminable process of back orders and extracts. For example, the Medical Department was dependent upon other technical services for procurement of web equipment, electric motors, mattresses, and other nonmedical supplies. Sometimes, the supplies were not placed in procurement until shortages were revealed by the effort to build a unit assembly. Even after the supplies were procured and shipped by the other services, there still remained the problem of combining them with the medical items in the assemblies. If the assembly was to be shipped complete, this process was accomplished at the medical depot; but frequently, to save time and to prevent crosshauling, the "marrying-up" process was performed at the Zone of Interior installation which received the assembly or at the port of embarkation to which it was shipped.[29] Assemblies were held for weeks and sometimes months, awaiting the arrival of missing items, and many units were shipped incomplete. The mere process of packing and storing hospital assemblies, pending requisitions for them, also resulted in immobilizing large quantities of critically needed medical supplies.

Another problem arose when basic equipment lists were changed or when packing instructions were altered after an assembly was packed, labeled, and stored. Such changes made it necessary that depot personnel remove the assembly for storage, make the indicated alterations, and repack it—work which involved large quantities of packing supplies and many hours of labor. Some depots tried to solve this problem by building only a limited number of assemblies, which were held for emergency requisitions, and by maintaining a sufficient quantity of stock to build any additional assemblies that might be required. When medical supplies became comparatively plentiful, this solution was quite practicable, for a large assembly could be constructed within 2 weeks.[30]

While the assembly concept had definite advantages, execution of the concept caused many serious problems for the Medical Supply Service during World War II. Tremendous major assembly requirements were relatively predictable, unlike those for minor assemblies. The lateral transfer of kits and chests among units was necessary because of volume, movement, and changes in priority of tactical units; this made it impossible to determine total assets as they pertained to material in the hands of troops. Major assemblies when issued were more stable and controllable, but had an irrepressible tendency to

[29] See footnote 27(1), p. 134.
[30] See footnote 21, p. 130.

FIGURE 31.—Hospital assembly, ready for overseas shipment.

fly apart in transit because of their size. For example, complete table-of-organization equipment for a 1,000-bed general hospital comprised one assembly of more than 3,000 items. It weighed over 600,000 pounds and required approximately 20 freight cars for shipment. When one of these assemblies was shipped to a Zone of Interior hospital, it was relatively unimportant if the 20 freight cars arrived at different days provided the last one arrived on time. For an assembly destined for use in a general hospital overseas, the situation was entirely different. If the whole assembly did not arrive as a unit, the port was faced with the almost impossible job of reassembling it (fig. 31).

Regular and Emergency Requisitions

The building and shipment of hospital assemblies was only one method by which medical supplies were distributed to Zone of Interior installations. The other, and more important, method of accomplishing the task was the filling of regular and emergency requisitions initiated by the medical supply officers.

After Pearl Harbor, speed became more essential. In February 1942, the medical supply officers began to send their requisitions directly to the distribution depot, which was empowered to approve all requisitions except for controlled items and quantities in excess of authorized allowances. Any requisition on which the depot lacked authority to approve and fill was forwarded to the Supply Service for a final decision.

These forwarded requisitions called for quantities in excess of allowance, for nonstandard supplies, or for unauthorized equipment. As the war progressed, the number of requisitions forwarded for the approval of the Surgeon

General's Office steadily mounted; before the conflict ended, disposition of these requisitions became the most time-consuming duty of the Issue Division, Supply Service. This work grew in volume, despite the many efforts to decentralize, so far as possible, all phases of the distribution process. It was quite necessary, however, for the Surgeon General's Office to exert firm supervision over the issue of controlled items and quantities of supplies in excess of authorized allowances, for only in this manner could procurement and distribution be coordinated.

The depots' work in the distribution of medical supplies may be divided into three parts: receiving and editing the requisition; accomplishing the preliminary paperwork; and selecting, packing, and shipping the supplies. The editing process determined that the items were properly identified, were authorized for the station which had requisitioned them, and were not requested in quantities exceeding allowances. International Business Machines were used to ascertain if the items were in stock, to obligate the stock, and to print shipping tickets. The tickets were transmitted to the issue room, the stock was withdrawn by the selectors, and the items were packed and made ready for shipment. After "tally-outs" and inspection, the papers were transmitted to the transportation department and the supplies were shipped.[31]

The unpreparedness of industry, the production timelag, the scarcity of certain raw materials, and the administrative friction of a great buying machine all contributed to delays in placing orders and to delays in the manufacture of medical supplies and their shipment to depots. The simple result was the inability of the depots to fill many of the requisitions they received. When stock was not available, but was due in from procurement, the requisition was placed on "back order," a procedure which obligated the soon-to-be-received supplies to the filling of these requisitions. The number of items on back order, therefore, is some indication of the extent of shortages. In May 1942, on back order at the St. Louis depot were approximately 3,700 medical items, the most important of which were sterilizers, rubber goods, generators, anesthesia apparatus, litters, and X-ray machines. This large number of back orders was gradually reduced, but it is significant that, as late as May 1945, a total of 1,250 items were on back order at this depot.[32]

In the emergency and early war period, a depot unable to fill a requisition for urgently needed supplies extracted the requisition to the Surgeon General's Office. After consulting the consolidated stock report, supply officers in Washington, D. C., sent the requisition to the depot which had a supply of the required items. The system broke down when shortages of many items became nationwide. The consolidated stock report, moreover, was not an accurate record of stock location during most of 1942 and the early months of 1943. So many requisitions were received and filled after the depots' "cutoff date" and before the stock report could be compiled that the report was out of date,

[31] See footnote 27(1), p. 134.

[32] (1) History of the St. Louis Medical Depot, 7 Dec. 1942–7 Dec. 1943. (2) See footnote 27(1), p. 134. (3) History of the St. Louis Medical Depot, 7 Dec. 1944–8 May 1945.

for many items, on the day it was printed. The practice of extracting requisitions from one depot to Washington and thence to another depot nevertheless continued unchanged throughout 1942, with most unhappy results for the posts needing the supplies. Extracts of requisitions moved futilely from one depot to another, via Washington, to a third, fourth, or even a fifth depot.

Before the procurement program could be expected to make up all deficiencies, partial remedies were developed. The most outstanding and successful of these remedies was the establishment of the key depot system late in 1942. The distribution depots were "keyed" to receive, store, and issue certain classes of items in short supply. When a depot received a requisition for key items which were not assigned to it, an extract was forwarded to the key depot which stocked the items. Important advantages resulted from this system. During the first 6 months of 1943, the time required to process requisitions through depots was reduced by 50 percent. Many man-hours were saved by the elimination of fruitless extracts, and the small stocks of scarce items were less dispersed and their issue more strictly controlled.[33]

Central Stock Control

The establishment of a more efficient central stock control system produced distinct improvements in the distribution of medical supplies. The installation of electric accounting machines in the depots and in the Surgeon General's Office in 1941 was followed by the establishment of a new system of stock records, which by 1943 was in successful operation. Under this system, each depot submitted periodic reports to the central stock control point, located at first in Washington and later in New York. The principal information carried on these cards, for each item of medical supply, was the quantity on hand, quantity on back order, quantity due in from procurement and transfers, and the quantity issued. The central stock control point sorted the punched cards and printed periodic stock reports, which showed the information of each depot and a total for all depots.

The preparation of a consolidated report a few days after the cutoff date made possible an efficient system of centralized stock control. Using the consolidated stock report, the Surgeon General's Office controlled procurement and distribution which was impossible in peacetime. It became practicable to compute short-term procurement requirements and to direct shipments from manufacturers to the proper depots. More important for distribution, the central stock control point was able to transfer stock between depots and to send requisitions or extracts to the depots which had the needed stock.[34]

The technique of ordering medical supplies was also changed in the interest of conservation. Throughout 1942, medical supply officers of training camps and general hospitals submitted to their distribution depots three types of requisitions: Semiannual, quarterly (for deteriorating items), and emergency

[33] See footnote 16(2), p. 127.

[34] Material submitted informally by Col. S. B. Hays, MC, Supply Service, 13 May 1946.

requisitions. Shortly after the attack on Pearl Harbor, special requisitions were added, differing from the emergency type in that they were produced by the activation and expansion of training camps, and thus were intended to fill urgent needs which could be anticipated. In January 1943, a thoroughgoing change was made. From that date, all requisitions were submitted monthly and were divided into three new categories according to the type of supplies required: standard expendable supplies, standard nonexpendable supplies, and nonstandard supplies. In addition, a staggered schedule was arranged by each distribution depot, so that the flow of requisitions from the posts would be evenly spaced over all the days of the month. This was a pronounced improvement over the system which it succeeded. Serious shortages of medical supplies had been aggravated by allowing the posts to hold a quantity sufficient for 6 months. The institution of monthly requisitions was an attempt to get the greatest use possible from the insufficient supplies then available.[35]

Although this change in requisitioning procedure produced good results, it was soon obvious that more heroic measures were necessary. As the number of training camps and general hospitals increased during 1942–43, the quantity of medical supplies held in storage at these posts proportionately increased. And as shortages became more acute, medical supply officers were tempted to hoard against possible future needs. Even under normal circumstances, a large quantity of medical supplies were, from necessity, unavailable for immediate use. The distribution "pipeline" remained full, and a considerable quantity was in storage. This meant, specifically, that large amounts of medical supplies were always in transit and that another quantity remained in storage at the factory, medical depot, and the warehouses of the post. It became essential, therefore, to reduce these idle supplies to the smallest amount commensurate with efficient operations. Immediate shipment by the manufacturer, elimination of delays in transit, and speedy filling of requisitions submitted to depots offered a partial solution to the problem.

These factors made a tight stock control system absolutely essential to accomplish a fair and economical distribution of medical supplies. For many years, the control of stocks at posts and general hospitals had been inadequately administered. Hospitals were allowed to carry a year's stock of nondeteriorating items and a 6-month supply of deteriorating items. In addition, no accurate due-in records were kept. As hospitals grew in number and size and as requisitions were submitted with increasing frequency, it became impossible for supply officers to maintain an accurate knowledge of what was on order. In the fall of 1942, therefore, the Surgeon General's Office devised a new stock record card for posts and general hospitals which showed a stock level for each item, receipts, issues, transfers, stock on hand, and stock due in. The stock level, as originally established, was sufficient to care for a post's needs for 60 days, calculated from actual issues made during the previous 90-day period. In the spring of 1944, when the demand for supplies in theaters

[35] See footnotes 18(2), p. 128; and 27(1), p. 134.

of operations had mounted to unanticipated heights, the level of stock authorized for posts was reduced to a 45-day period. The stock level for nonexpendable Medical Department items was reduced to the actual amount of the items on memorandum receipt at the posts, plus the necessary quantity on hand for the replacement of damaged or wornout equipment. At the same time, the Medical Department depots were authorized to maintain a stock level of only 90 days of anticipated issues. In September 1944, the stock level of depots was reduced to 60 days. This resulted in such a serious increase in out-of-stock items that, in February 1945, medical depots were authorized to return to the 90-day level for expendable items.[36]

Hoarding in Zone of Interior Installations

Post medical supply officers were expected to abide by authorized stock levels, to requisition no more than they needed, and to return to the distribution depot any excesses that developed. Each month, they submitted, to the distribution depot, reports which were supposed to reveal any excess supplies on hand. However, the experience of 1942 indicated rather clearly that stock levels must be policed by the distribution depot. Accordingly, in 1943, liaison sections were established in medical depots and staffed with personnel trained in stock control procedures. These liaison officers made quarterly visits to posts and general hospitals, examined the stocks on hand, and declared excess all supplies above the authorized levels. These excess supplies were returned to the distribution depot. At many training camps, the liaison officers discovered tremendous excesses in many items.

By summer 1944, liaison officers had reduced the more easily discovered excesses to such a point that their operations became routine in nature. Time was available, also, for the officers to discuss and offer suggestions on major supply problems which troubled post medical supply officers. During this period, moreover, substandard and obsolete surgical instruments were removed from the posts, and the inspection of these instruments became a duty of the liaison officers.[37]

These efforts to police stock levels were not altogether successful. Medical supply officers of training camps and general hospitals naturally considered that their primary job was to maintain sufficient supplies for their installations. If the medical supply officer hoarded his excesses, his immediate superiors were not inclined to censure him. But, if he promptly returned all excess stocks and then, at a later period, was unable to supply the needs of his units, his reputation as a prudent and foresighted supply officer would suffer. In fact, a division of power and responsibility, and a divergence of interests between the service commands and the Medical Department depot system

[36] (1) See footnotes 16(2), p. 127; 27(1), p. 134; and 34, p. 138. (2) Annual Report, Station Section, Issue Branch, Distribution and Requirements Division, Supply Service, OTSG, fiscal year 1944. (3) Notes on Supply Service Staff Meeting, 14 Dec. 1944. (4) Annual Report, Stock Control Division, Supply Service, fiscal year 1945.

[37] See footnote 23(1), p. 131.

made it difficult to police the stock levels. These two authorities, it is true, were subject to the same overall command in the ASF Headquarters; but the actual work of stock control was not done at this high level. It was done in the field, where divided responsibilities and clashing interests were most evident.[38]

From the viewpoint of post medical supply officers, some circumstances justified exceeding authorized stock levels. These levels, it will be recalled, were based upon previous consumption. Yet, when there had been no stocks of certain scarce items for many months, there was no issue experience upon which a stock level could be based. In many other instances, previous issues had been small because the stock was chronically low. The real need for an item, therefore, was not always indicated by the authorized stock level. Delays in the filling of requisitions created shortages at the posts and (because these shortages reduced issues) led to lower authorized levels in the future. In addition, some medical supply officers wished to retain excess supplies for they had good reason to believe that the patient census of their hospitals would soon increase. The service command surgeons were unwilling to declare any supplies as surplus for they feared a large influx of patients would result from the bitter fighting then in progress in Germany. These fears were well founded. In the late winter of 1944 and the early spring of 1945, Zone of Interior hospitals became crowded with overseas casualties.[39]

It became clear, during the last year of the war, that large quantities of excess supplies had been issued to, and were being held by, hospital pharmacies, operating rooms, and dental clinics. No surpluses appeared on the books of the medical supply officers or in the warehouses; for all practical purposes, the excesses were hidden away in the using installations. In January and February 1945, approximately 1,250,000 artificial teeth were recovered from dental clinics—a windfall which, together with quantities already on hand, was estimated to be sufficient for all needs during 1945 and 1946 and made possible the cancellation of several procurement contracts. In a survey of general hospitals by the chief of the Issue Division, Supply Service, excessively large quantities of quinine and dental burs were discovered and returned to distribution depots. In the summer of 1945, when medical installations began to close all over the country, even larger excesses were unearthed. In one general hospital an entire year's supply of Pentothal sodium (thiopental sodium) was located in the surgical service. Quite obviously, therefore, this type of hoarding not only created scarcities in less fortunate hospitals, but also led the Medical Department to purchase great quantities of unneeded supplies. Procure-

[38] During October and November 1944, when heavy fighting in Europe caused shortages in the Zone of Interior, service command surgeons were taking action contradictory to Medical Department policies by holding on to medical supplies above authorized stock levels. At least a part of this was caused by failure of the Surgeon General's Office properly to inform the service command surgeons, some of whom were not familiar with Medical Department policies. See Notes on Supply Service Staff Meeting, 5 Dec. 1944.

[39] (1) Annual Report, Station Hospital, Laredo Army Air Field, Laredo, Tex., 1944. (2) Notes on Supply Service Staff Meeting, 28 Nov. 1944. (3) Notes on Supply Service Staff Meeting, 23 Feb. 1945.

ment was based upon issues, and purchasing officers were unable to distinguish between issues for hoarding and issues for use.[40]

To wipe out the scarcities caused by hoarding, inspecting officers visited dental clinics, station hospitals, and general hospitals; but this was a remedy which took effect only after the disease had caused much damage. A revision of the Stock Control Manual for Stations sought to prevent the evil by extending stock control to hospital pharmacies, dental clinics, and other using agencies.[41] This, also, came too late for, by the time these new orders were issued (May 1945), Germany had collapsed and the entire world conflict was drawing to a close. Quite probably, many scarcities of medical supplies, which were so serious in 1942–43, were caused not by overall shortages, but by maldistribution of the quantities procured. And the large excesses recovered in 1944–45 clearly indicate that hoarding was partly responsible for this maldistribution.

From 1943 until the end of the war, an unremitting effort was made to operate medical depots more efficiently. Training programs for employees, work measurement studies, improved methods of packing and labeling, and use of materials-handling equipment were only the most outstanding methods employed in the pursuit of efficiency. The results were closely connected with the speedier distribution of medical supplies to training camps and general hospitals. During 1942–43, many requisitions remained in the depots for 4 to 6 weeks before they were filled; by the early summer of 1944, the usual period required was 10 to 14 days. The increasing abundance of medical supplies during the third year of the war was very influential, but administrative improvements within the depots had a considerable share, in producing this result.[42]

Central Service System

In the station and general hospitals, a noteworthy economy in the use of equipment was obtained through the establishment and operation of the central service system. During 1943, a number of hospitals inaugurated this system which centralized the storage, care, and issue of supplies and equipment used in certain diagnostic and therapeutic procedures. These items were highly specialized and could be used for any patient, but only as the occasion demanded. Their constant presence in each ward was unnecessary and entailed the expenditure of unreasonably large quantities of scarce medical equipment. The establishment of a central agency permitted a greater utilization of available equipment and also assured better care and longer life to critical materials. This innovation produced such good results during the latter part of 1943 that, early in the following year, a directive was issued, requiring all station hospitals of 750 beds or larger and all named general hospitals to

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[40] (1) Notes on Supply Service Staff Meeting, 6 Mar. 1945. (2) Address, Brig. Gen. Edward Reynolds to Medical Department officers assembled at Walter Reed General Hospital, 19 Sept. 1945, subject: Medical Supply Problems of World War II. [Official record.]

[41] War Department Technical Manual (TM) 38–220, Stock Control Manual for Stations, May 1945.

[42] See footnote 36(2), p. 140.

establish the central service system.[43] Obviously, the widespread adoption of this procedure relieved the shortages in essential equipment and aided the Supply Service in solving its procurement and distribution problems.

War Department Shipping Documents

Possibly the most extensive standardization in the supply system during the war was the War Department Shipping Document. First introduced on a trial basis in the summer of 1943, it became a permanent fixture in January 1944.[44] From the master copy, four variations were reproduced: order copy, property copy, overseas copy, and price copy.

The order copy was used by the consignor as a shipping order to the Storage Division which prepared the freight for shipment; as a packing list; as a basis for preparing bills of lading; as a basis for completing the property, overseas, and price copies of the shipping document; as a notice of availability to ports, when required; and, as a back order or extract form. Property copies were used by the consignor for domestic shipments to stations, depots, ports, holding and reconsignment points, and similar recipients; and, by the consignee, to tally-in shipments and as a basis for the stock record account. The overseas copies were used for shipments passing through water and aerial ports of embarkation and debarkation, holding and reconsignment points, and air in-transit depots. Price copies were used in instances where reimbursement or pricing in terms of unit cost was involved, such as lend-lease shipments.

The Army Service Forces extended the principles of the War Department shipping document to procurement activities with the publication in May 1944 of a vendor's shipping document—a combination form that standardized and simplified procedures for accepting, shipping, receiving, and invoicing shipments from vendors. This document expedited supply action and satisfied back orders before filling current requisitions with newly arrived stock. Its uniformity also was an outstanding factor in its use. However, its intrinsic value was never fully realized because the size of the unit assembled required a giant-sized shipping document to move it. The volume and length of the shipping document invited errors and misinterpretation, and much training of depot personnel in its use was necessary.[45]

DISTRIBUTION OF MEDICAL SUPPLIES TO THEATERS OF OPERATIONS

Responsibility for Distribution of Supplies

The responsibility of the Medical Department for distribution of its supplies to overseas commands was limited. The ports of embarkation through which the supplies moved and the vessels and aircraft which conveyed them

[43] War Department Memorandum No. W40–44, 12 Apr. 1944, subject: Central Service System in Army Hospitals.

[44] Army Service Forces Manual M401, War Department Shipping Document, 25 Jan. 1944.

[45] Army Service Forces Manual M410, Vendor's Shipping Document, 5 May 1944.

abroad were not under the Medical Department's jurisdiction. Once overseas, the supplies were transported, stored, and issued under the supervision of the theater commanders, who were completely independent of the technical services. Yet, in the first stages of overseas distribution, the Medical Department had important responsibilities, the discharge of which placed the supplies on board the ships and consigned them to using installations.

The depot system was employed for both Zone of Interior and overseas distribution. Port filler depots were the most important installations for the supply of overseas commands. Located at strategic spots some distance from the seaboard, these depots had, as one of their most important missions, the responsibility of receiving medical supplies of all classes, storing these supplies in warehouses, and shipping them to ports of embarkation. At Toledo and Atlanta, assembly depots packed the hospital assemblies, and shipped them to the ports when needed. In addition, many depots of the Medical Department were keyed to receive and store certain scarce items; and to those depots, ports of embarkation sent extracts of requisitions. Finally, holding and reconsignment points, operated by the Transportation Corps, were used to hold completed hospital assemblies so that requisitions from ports could be speedily filled. Since these holding and reconsignment points were located close to the ports, the assemblies could be moved quickly to meet ship sailings on short notice.[46]

Ports of Embarkation

At the apex of this system stood the ports of embarkation, located at Boston, Mass., New York (fig. 32), Hampton Roads, Va., Charleston, S. C., New Orleans, La., Los Angeles, Calif., San Francisco, and Seattle. Through these ports, troop units and replacements moved to overseas stations, carrying with them their initial allowances of supplies and equipment; and, through them, vast quantities of maintenance supplies were funneled to all fighting fronts. Administered at first by the Quartermaster Corps and during the greater part of the war by the Transportation Corps, the ports of embarkation were nonetheless important parts of the Medical Department's supply system.

Each port had a Medical Supply Division which was headed by a port medical supply officer. This officer was on the staff of the port commander, functioning directly under him, and was the technical agent of The Surgeon General in supply matters. The port medical supply officer's duties and responsibilities are difficult to describe for he was both a staff officer and an operating officer. His duties included advising the port commander on matters pertaining to medical supply, maintaining shipment status reports, following up all requisitions scheduled for overseas shipment, checking on serviceability of equipment of all units moving through the port, and purchasing medical supplies needed in emergency to supply outgoing forces. The port medical supply officer also maintained port stocks of deteriorating items by placing delivery

[46] See footnote 16(2), p. 127.

FIGURE 32.—Portion of New York Port of Embarkation, heavily populated with famed World War II Victory ships and Liberty ships, 1943.

orders against open contracts, furnished medical equipment and supplies to Army transports and hospital ships, furnished emergency supplies to port terminals and staging areas, and exercised staff supervision over stock control in the separate commands of the port.[47]

Under the plan inaugurated in March 1942, each port of embarkation supplied an assigned overseas area. For example, the New York port, with Lt. Col. Theodore M. Carow, MC, as medical supply officer, was responsible for supply in the European theater, the Mediterranean theater, and the Azores; the Boston port, of which Maj. William A. Bell, MAC, was medical supply officer, served U.S. garrisons in Greenland and Newfoundland; and the Seattle port, whose medical supply officer was Maj. Joseph B. Kingsley, SnC, furnished supplies to Alaska and the Aleutian Islands. Close liaison was maintained between the port and its overseas area by survey trips, cable, and ordinary correspondence.

As overseas commands and combat areas developed and port activities surged beyond capacity, supplies were moved from ports as rapidly as possible. Additionally, because primary ports were not physically capable of

[47] (1) Memorandum, Brig. Gen. C. P. Gross, Chief of Transportation Service, to Commanding General, New York Port of Embarkation, 2 May 1942, subject: Port Medical Supply Officers. (2) Training Kit of the Port Medical Supply Division, New York Port of Embarkation, 22 July 1944.

transshipping all supplies required by the larger and more active theaters, and for economy reasons, primary ports could direct that some cargo be loaded at other ports known as outports. Primary ports, however, retained the responsibility for control and timely delivery of material to their designated consignees. In practice, a part of the port medical supply officer's mission was absorbed by the Oversea Supply Division of his port, which was staffed with representatives of all technical services and served as a clearing house and control center for overseas supply actions.

The port medical supply officer carried stocks of biologicals, antimalarial drugs, and other items needed to fill last minute shortages of outgoing troops, and emergency requisitions from overseas. To meet such requirements, it was often necessary to resort to local off-the-shelf procurement. Port stockage was contrary to basic ASF policy and was a subject of controversy between ASF and The Surgeon General's staff, but was condoned because of the urgency of the need. Early in 1945, the medical local procurement function was absorbed by a newly established Port Control Procurement Division.

Medical Maintenance Units

Shortly after the United States entered the War, the acute need for a uniform method of automatic supply of medical items to overseas commands became apparent. Directives of the War Department originating with the Assistant Chief of Staff, G–4, called for immediate action. As a result of concerted effort by Mr. Mead M. Messick, civilian consultant to the chief of the Storage and Distribution Division of the Surgeon General's Office, a medical maintenance unit was developed, which provided great quantities of medical supplies for U.S. soldiers in all parts of the world. Each unit consisted of 700 to 900 medical items and was designed to supply 10,000 men for 30 days. The entire unit weighed 15 tons, occupied 1,500 cubic feet of space, and was valued at approximately $10,000.[48] To each major troop unit stationed overseas, a number of medical maintenance units was shipped which was sufficient to provide the prescribed level of supply. This level varied from time to time during the war, but it never fell below 60 days as a minimum nor rose above 180 days as a maximum. As additional troop units moved overseas, they were provided with the requisite number of maintenance units; and, after the arrival of the troops, other units were shipped to maintain the level of supply.

Instructions governing the medical units made the port medical supply officers responsible for insuring timely delivery. This included recommending to the Surgeon General's Office the number of such units to be placed to the port's credit in the designated filler depot. Originally, the port filler depots established credits upon which the ports of embarkation drew whenever it became necessary to ship maintenance units overseas; but, beginning in 1943, they were shipped from port stocks. During a large part of the war, however,

[48] Letter, Lt. Col. S. B. Hays, MC, to Medical Supply Officer, New York Port of Embarkation, 19 Mar. 1942, subject: Medical Maintenance Unit.

the port medical supply officers were responsible for requisitioning or shipping sufficient medical maintenance units to maintain the supply in the overseas theaters at the prescribed level.

Supply officers in the Zone of Interior looked upon the medical maintenance unit as a temporary expedient, designed to provide medical supplies to overseas bases only until the bases accumulated the issue experience to guide them in requisitioning the items needed. Before going on a requisitioning basis, each base was authorized to inform its port of deficiencies in the automatic supply system. It could, for example, request that certain items be deleted from subsequent shipments, that other items be added, or that the prescribed quantities be reduced or increased. This flexibility, it was thought, would enable the port to adapt the maintenance units to the needs of the various troop units and would provide information leading to revision of the standard medical maintenance unit. Numerous valuable suggestions were indeed received, but some overseas supply officers were content to take these units just as they were sent. They were inclined, moreover, to remain on this automatic basis of supply for protracted periods. The resulting imbalance was a natural one and could have been predicted by any supply officer familiar with the variety of conditions under which American soldiers lived and fought. For example, the quantities of quinine in the maintenance unit resulted in large surpluses in Alaska and in acute shortages in the South Pacific. The consumption of many other items varied from place to place, with the result that enormous excesses were built up in some parts of the world while soldiers in other areas did not receive their minimum needs.

To overcome this problem, a Balanced Medical Depot Stock listing was developed early in 1943. The new listing was formulated by supplementing most items on the 1,000-bed general hospital list with an estimated 90 days' supply of all items not found in the 1,000-bed assembly, but included in other selected Medical Department standard unit assembly lists, plus 30 medical maintenance units. Certain items were added or deleted by professional personnel to conform to possible needs and to complement the peculiarities of the geographic area.[49]

Final Reserve Units

American experience in the Bataan campaign seems to indicate that troops should be provided with a quantity of medical supplies to be used only when they were besieged. To satisfy this presumed need, a Final Reserve Unit was devised, which consisted of 200 highly necessary medical items in quantities sufficient for 10,000 men for 30 days. This unit was approximately one-third the size of the medical maintenance unit and had a monetary value of $5,000. Each overseas base was required to have on hand a 90-day supply of final reserve units—three units for each 10,000 men—to be provided by the

[49] (1) See footnotes 16(2), p. 127; and 48, p. 146. (2) Freedman, Abraham: Overseas Supply, 22 Nov. 1944. [Official record.]

port medical supply officer when the troops embarked. Deteriorating items were to be rotated, and each box in the unit was marked: *Final Reserve—Medical Supplies—Not for Routine Use.* When and if these supplies were consumed, the overseas base was expected to notify its port, so that additional units could be shipped.[50]

Several factors tarnished the repute of this final reserve. Instructions governing its use were issued under a classification of Secret so that, in many instances, the personnel actually receiving and handling the supplies were never told how they were to be handled. This resulted in considerable confusion and disturbed the morale of the forces concerned. Keeping these supplies separate from other stocks, even though the items were the same as those on hand, created a variety of problems in areas where mobility was of the essence and adequate storage facilities were scarce or nonexistent.

Transportation Problems

Requisitions were prepared by medical supply officers of the theater surgeon's staff and were transmitted by radio, cable, or airmail to the appropriate port of embarkation. Here, they were received by the Oversea Supply Division, and then submitted to the port medical supply officer for editing. All controlled items, all items in excess of allowances, and all nonstandard items were referred to the Distribution Division, ASF, for approval, the latter agency basing its decision upon information received from the Surgeon General's Office. Early requisitions called for amounts far in excess of those authorized by consumption tables because of the use of a projected troop strength of which the ports were unaware. Later, theater troop strengths were announced in tables published by the Oversea Supply Divisions of the ports, and thus requisitions came to be submitted and edited on the same basis. After editing, the requisitions were returned to the Oversea Supply Division, where extracts were prepared and sent to the appropriate port filler depot. The port medical supply officer maintained close liaison with the port filler depot, to assure that the supplies were available within the convoy period for which they were planned.

To get the supplies to the theater in the required time, a Cargo Priority System was inaugurated in 1944. Upon request of the theater, the Oversea Supply Division was authorized to apply priority 1 to any item on a requisition, priority 2 on any special requisition, or priority 3 to all other requisitions. The port medical supply officer was responsible for expediting priority 1 items into the port for loading as soon as possible. Priority 2 items were given attention to insure shipment within the scheduled convoy period. Priority 3 items were not expedited, but were followed up routinely to see that shipments were made. When the depot made a shipment to the port, advance copies of the War Department Shipping Document were sent for the use of the Port Transportation Division and the port medical supply officer. Upon receipt

[50] See footnote 49, p. 147.

of shipments at the port, tally-in copies of the shipping document were furnished to the port medical supply officer. And, when the supplies were loaded aboard the ship, he received "floated" copies of the hatch tally. Thus, the port medical supply officer received and maintained records on the progress made with each requisition, and was able to check on, and expedite the filling of, requisitions.[51]

Considerable delay and difficulty were caused by the failure of overseas commands to prepare and submit requisitions as authorized. Sometimes requisitions for badly needed supplies were sent directly to the Surgeon General's Office. Instead of hastening the arrival of the supplies, this procedure delayed them; such requisitions were routinely referred to the ports of embarkation, to which they should have been addressed in the first instance. Frequently, the requisitions did not give sufficient information. These omissions occasioned serious delays in filling the requisitions for editing authorities were compelled to query the theater and obtain the missing data.[52]

Equipping Tactical Units

In addition to providing for automatic supply and the filling of itemized requisitions, the Medical Department supply system had important responsibilities in equipping all tactical units of the Army with organizational equipment before overseas movement. In 1942, a Field Equipment Subdivision was established in the Finance and Supply Division of the Surgeon General's Office to discharge this duty. Tactical units customarily received their organizational equipment through the port medical supply officer, who drew upon his distribution depot. During most of the war, however, and because of shortages, this equipment could be supplied only through the aid of the Surgeon General's Office. Reports of shortages were transmitted to the Field Equipment Subdivision, which consulted stock reports from depots and ordered shipment of the needed equipment. So far as possible, during 1942–43, the tactical units were completely equipped at their home stations, and any remaining shortages were supplied by shipment to the port of embarkation from which the unit was scheduled to depart. Occasionally, units left for overseas stations before their equipment could be furnished; in such instances, the equipment was shipped to the port and followed the units overseas. These belated shipments became so numerous, and in so many instances never reached the troop unit to which they were directed, that in the spring of 1945 a new procedure was adopted. Thereafter, when the equipment could not reach the home station by the required date, the unit was so informed and the requisi-

[51] For full discussion of procedures employed in filling requisitions at the New York port, see footnote 49(2), p. 147.

[52] (1) The original source for this paragraph was "Charleston Port of Embarkation, Overseas Medical Supply," an official record used by Capt. Richard E. Yates, MAC, in preparing the first draft of this chapter. The document has since disappeared, but the practice of sending requisitions directly to the Surgeon General's Office is verified by (2) Circular Letter No. 36 [(Supply No. 6), OTSG, 5 Feb. 1943, subject: Overseas Supply], which officially terminates it.

tions were canceled. The missing items were supplied from port stocks or, if not available at the port, were issued at the overseas destination.[53]

Priority System for Medical Supplies

In the meantime, the available organizational equipment was too limited in quantity to supply all units moving overseas in 1944. To equip the units scheduled to participate in the European campaign, the Red List procedure was initiated in June of that year. It was stipulated that all units on the list must be fully equipped before overseas movement and that the troops and their equipment were to be combat loaded. This plan required special procedures by the Supply Service, the medical depots, and the units themselves. The units on the list were notified early of the pending movement so that local supply officers could make a final effort to complete their equipment. Shortages were promptly reported to the Surgeon General's Office, which issued top priority requisitions to the depots. When time was not available for this direct shipment, the equipment was sent to the holding and reconsignment point at Elmira, N.Y., where shortages for each unit were segregated and assembled. Then, equipment was shipped to the proper port of embarkation and thus was available when the troops arrived.

In the execution of Red List procedures, several problems developed. Frequent transfers of units within the Zone of Interior resulted in much cross-hauling, lost shipments, and duplicate shipments. The misinterpretation of directives regarding equipment which should be sent to the home station and that which should go to Elmira resulted in duplicate shipments and excesses at Elmira. At length, the holding and reconsignment point became so swamped with freight that it was impossible, within the time available, to sort and mark the equipment. This produced numerous shortages, especially in hospital assemblies, that had to be filled from port stocks.

Despite these difficulties, the achievements produced by the Red List procedure were impressive. The list included 100 separate movement orders, directing the overseas movement of approximately 725,000 men and their equipment. In discharging its supply responsibility, the Medical Department provided the appropriate organizational equipment for 20 infantry divisions; 8 armored divisions; 1 airborne division; 42 general hospitals; 14 field hospitals; 22 evacuation hospitals (400-bed); 1 evacuation hospital (750-bed); 17 hospital trains; and 2 medical laboratories.[54]

Preshipment of Supplies

In 1943, large quantities of medical items were shipped to the British Isles in anticipation of heavy troop movements to follow. This preshipment plan

[53] (1) See footnote 16(1), p. 127. (2) Memorandum, Maj. R. L. Parker, MAC, to The Historical Division (attention: Capt. R. E. Yates), 6 Mar. 1946, subject: Supplementary Material on History of Supply Service Not Previously Covered.

[54] (1) See footnote 53(2), above. (2) Annual Report, Equipment Branch, Issue Division, Supply Service, OTSG, fiscal year 1945.

was based on the knowledge that the excess shipping space then available would be transformed into a deficit when the movement of troops reached its peak. The decision was made, therefore, to take advantage of the available shipping space and to build up a stock of medical equipment and supplies which would partially support the large scale campaigns in prospect.

The first shipments under this plan, made in April 1943, contained specific organizational equipment for the troops plus 45 days of maintenance supplies. Units included in the preshipment plan returned their organizational equipment to local supply officers. All outstanding requisitions were canceled, and any subsequent ones were returned without action. The troops carried a minimum of essential equipment, referred to as TAT (To Accompany Troops), including individual medical kits and Medical Department chests Nos. 1 and 2. The kits proved to be readily available and very practical in providing medical care en route, but the chests, packed in the hold of the ship, were not accessible to the using organization during the entire trip.

Before the troops left their home stations, the Supply Service studied the appropriate tables of organization and equipment and calculated the quantities which would be required for the units. Shipping orders for these quantities were then sent to the appropriate depots. All shipments of this equipment moved through the New York and Boston ports: 75 percent through New York and 25 percent through Boston. The packing cases were marked "ADV" to identify them as advance supplies and additional markings ("SOXO" and "GLUE") represented the destination ports in the United Kingdom. Having arrived in the British Isles, the supplies were conveyed to a designated key depot and then were transported to a depot near the troop unit's permanent camp. Poor transportation facilities and pilfering caused the last movement to be accompanied by considerable losses, and in March 1944, Medical Department units were authorized to move into the key depot and pick up their equipment with their own transportation.

The advantages of preshipment were numerous and important. It allowed the shipment of supplies in bulk and eliminated the losses and damage experienced when organizational equipment accompanied troops. It permitted the distribution of critical items within the theater according to the tactical priority of units. And it made possible the modification of equipment in bulk.

There were, however, two distinct disadvantages to the plan. Throughout the period, troop lifts were subject to frequent amendments, making it difficult for the Medical Department to plan its shipments. In addition, numerous changes in tables of organization and equipment lists were made after the publication of a troop lift and before the movement of troops. This caused units to requisition new items before the items were available in the theater, and necessitated the cancellation of requisitions and the augmentation of previously calculated requirements and shipments. This latter disadvantage very probably is inseparably connected with all supply operations in a lengthy war,

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and can be eliminated only by foregoing the advantages which accrue from the improvement of equipment lists.[55]

Shipment of Penicillin and Blood

Throughout the war, special procedures were adopted in the shipment of medical supplies whenever the tactical situation or the nature of particular supplies required a departure from routine operations. The bulk of the supplies, of course, moved through ports of embarkation and was conveyed overseas by surface ships; but, from 1943 until the end of the war, two important medical items—penicillin and whole blood—used facilities of the Air Transport Command for speedy distribution to theaters of operations. Air shipment was rendered necessary by the perishability of the items and by the pressing needs of overseas installations.

Routine air priorities were established, the commercial laboratories which produced penicillin rushed the drug to aerial ports of embarkation, and planes of the Air Transport Command carried increasing quantities of the item to American troops on all continents. Penicillin ceased to be an allocated item in 1945, and the quantities shipped depended upon the expressed needs of overseas commands. In addition, surface vessels began to carry a portion of this cargo late in the war. Despite these changes, however, the distribution of penicillin was never characterized by the routine procedures which were used in shipping more stable and more plentiful medical supplies.[56]

Experience gained in the air shipment of penicillin proved to be valuable in the distribution of whole blood, an even more perishable item. Fortunately, the need for whole blood, first demonstrated by the North African campaign, had been anticipated by the Supply Service and most essential items of equipment had already been developed, such as anticoagulant solutions, donor sets, and recipient sets. The farflung service of the Red Cross, established to procure donations for blood plasma, was available to furnish the type "O" whole blood which was needed at the battlefronts. Using the facilities of the Air Transport Command, whole-blood shipments to Europe were started on 21 August 1944, within a few days after the request for them was received by The Surgeon General.

In the beginning, the shipments were not refrigerated for it was assumed that the relatively high altitudes maintained by the planes would keep the blood sufficiently cool. The bottles were chilled before and after the blood was drawn; and, when ready for shipment, they were packed in cardboard boxes wrapped in heavy paper. It was discovered, however, that refrigeration of the blood en route was desirable. In the spring of 1945, the Technical Division of the Surgeon General's Office developed a special shipping container, which consisted of an insulated refrigerator holding a can of wet ice. The refrigerator weighed 35 pounds empty and 104 pounds when fully packed; it held 24 bot-

[55] See footnote 53(2), p. 150.

[56] See footnotes 36(2), p. 140; and 40(2), p. 142.

tles of 600 cc. capacity, a can with 19 pounds of ice, and 24 recipient sets. Temperature of the whole blood was maintained at less than 5° C. during 24 hours of summer weather. The plan for shipping blood to the Pacific theaters was similar to the procedures established for Europe, except that it was Navy-operated.[57]

Editing Requisitions

As the war progressed, the problems of overseas distribution were rendered more acute by the excessively large requisitions transmitted to the ports of embarkation. Supply officers in the theaters were authorized to maintain levels of supply sufficient for a designated number of days. The quantity of each item stocked depended upon the days of supply authorized, the number of troops in the theater, and the maintenance or replenishment rates. It was expected that the maintenance factor would be largely based upon issue experience, but the uncertainties of war rendered it necessary that allowance be made for unexpected and unprecedented needs which only the future could fully disclose.

The elasticity of this maintenance factor produced requisitions for excessively large quantities of medical supplies; and these requisitions, in turn, created serious problems in the ports of embarkation and in the Surgeon General's Office. Requisitions for unusually large quantities were edited by these agencies, but there was a disposition to be lenient in the editing and thus allow the theaters to have what they wanted, so far as the availability of the supplies and equipment permitted.[58] As an inevitable result, inequities and maldistribution resulted.

By December 1944, Supply Service officers concluded that the policy of lenient editing must be abandoned. So many large requisitions had been received recently from the Pacific that strict editing would be necessary if other theaters were to have their minimum needs supplied.[59] A large part of this difficulty apparently was caused by poor stock control procedures in the theaters, the natural tendency to hoard, and by failure to base requisitions upon issue experience. Continued use of medical maintenance units also perpetuated the basic error of automatic supply which produced some shortages and great surpluses.

Extremely large requisitions from the European theater placed a burden upon ports of embarkation and medical depots. A 90-day stock level for depots, based upon previous issues, was adopted on 1 July 1944. During the 3 months which followed, the Medical Department learned that this stock level was unequal to the huge quantities of medical supplies used in mechanized warfare. After beachheads were established on the Normandy coast and requisitions were received for direct shipment to the Continent, it became apparent

[57] Medical Department, United States Army. Blood Program in World War II. Washington: U.S. Government Printing Office, 1964, pp. 206–215.

[58] Notes on Supply Service Staff Meeting, 13 Oct. 1944.

[59] Notes on Supply Service Staff Meeting, 22 Dec. 1944.

that a quantity of many items sufficient to last 90 days before the invasion was insufficient to meet a single overseas requisition. Stocks at Binghamton, the port filler depot which served New York, were soon exhausted; and extracts were rushed to the eastern and central depots in a frantic effort to fill the requisitions. Despite new procurement and heavy interdepot transfers, the port filler depot continued to be burdened beyond its capacity until V–E Day, in May 1945, brought relief.[60]

The foregoing experience clearly indicated the necessity for accurate, up-to-date maintenance rates. In April 1945, a special board was established by the Stock Control Division, Supply Service, to review maintenance issue experience for the period 1 January 1944 to 31 March 1945, and to compute maintenance rates on the basis of that experience. Near the end of the war, therefore, the Medical Department developed and put into use maintenance rates which reflected its experience in preparing for combat, stockpiling in theaters, and actual expenditures of supplies and equipment under combat conditions.[61]

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[60] See footnote 36(4), p. 140.
[61] See footnote 36(4), p. 140.

CHAPTER VI

Medical Supplies Under Lend-Lease

While it was furnishing medical supplies to U.S. Army troops in all parts of the world, the Medical Department had the additional responsibility of providing for the supply needs of numerous countries actively warring against the Axis or in a state of friendly neutrality. The Lend-Lease Act, approved on 11 March 1941, granted authority to sell, exchange, lease, or lend supplies and equipment to any government whose defense the President deemed vital to the defense of the United States. Under this authority, medical supplies valued in excess of $140 million were distributed among more than 30 nations. Although these supplies represented only three-tenths of one percent of the value of all lend-lease shipments, they constituted more than 15 percent of the total value of Medical Department procurement during the same period.[1]

Accepting War Department responsibility for the administration of the Lend-Lease Act, the Secretary of War authorized the establishment of a Defense Aid Division in the Office of the Under Secretary of War to coordinate War Department activities, to route requests for lend-lease aid to technical committees for screening and recommendations, and to authorize procurement and transfer of the supplies and equipment.[2] The technical committees were known as Defense Aid Requirements committees, whose principal function was the determination of material requirements by type, quantity, and destination. Such committees were established late in April or early in May for Ordnance, Chemical Warfare, Signal, Engineers, and Quartermaster Corps. The first medical supplies distributed under lend-lease were procured by the Treasury, and so a Medical Defense Aid Requirements committee was not set up until June. On the level above the War Department, responsibility for administering the act was assigned to the newly-created Division of Defense Aid Reports, Office for Emergency Management, which was superseded in October 1941 by OLLA (Office of Lend-Lease Administration).[3]

To carry out the determinations of the Defense Aid Medical Requirements Sub-Committee, a Defense Aid subsection, staffed by one officer and four civilian employees, was established in the Finance and Supply Division, SGO (the Surgeon General's Office) to procure and transfer all medical supplies furnished by the War Department under lend-lease.[4]

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[1] (1) House Document No. 41, 80th Congress, 1st Session, Twenty-Third Report [of the President] to Congress on Lend-Lease Operations, January 1947. (2) See appendix B, p. 569.

[2] Letter, The Adjutant General to the Chiefs of Arms and Services and the Divisions of the War Department General Staff, 10 Apr. 1941, subject: Procedure Under the Lend-Lease Act.

[3] (1) Executive Order No. 8751, 2 May 1941. (2) Executive Order No. 8926, 28 Oct. 1941.

[4] This subsection seems to have been established in July or August 1941. Before that time, the very small lend-lease operations required about 20 percent of the time of one officer. Memorandum, Lt. Col. F. C. Tyng, MC, to Budget Officer for the War Department, 15 July 1941.

ROLE OF THE MEDICAL DEPARTMENT IN LEND-LEASE

The first implementation of the Lend-Lease Act by the Medical Department involved the supply of 2,000 standard litters, as directed in a memorandum from the Secretary of War to The Surgeon General on 9 April 1941. These litters were transferred from regular depot stocks to the United Kingdom for probable retransfer to Yugoslavia, and the cost was to be charged against the initial lend-lease appropriation. No further demands were made on the Medical Department until July 1941, when Chinese requisitions were received for medical supplies worth $1.2 million during construction of the Burma-Yunnan Railway (fig. 33). At about the same time, the United Kingdom presented requisitions for field equipment valued at $950,000. These two requirements put the Surgeon General's Office in "the Lend-Lease business." [5]

Development of Procedures

During this early period, storage and issue activities for medical lend-lease were conducted in depot space provided at Shamokin, Pa., Voorheesville, N.Y., and Marietta, Pa. Between July and December 1942, such activities were centered in the Marietta depot. In the latter month, the Sharonville Engineer Depot, Ohio, provided space for lend-lease operations. This installation was succeeded, in August 1943, by the Louisville Medical Depot, Louisville, Ky., which continued until the end of the war as the only depot engaged in international aid activities. The many preliminary activities were, of course, conducted by OLLA, by the Defense Air Division of the Office of the Under Secretary of War, and by the Defense Aid Sub-Section, SGO.[6]

One difficulty, however, was soon apparent. Since a specific allotment of funds was made to cover each requisition, it was necessary to make numerous suballotments within the Surgeon General's Office and to extend suballotments to each participating procurement and receiving depot so that all costs occurring with each requisition could be charged against the specific allotment. In addition, materials available in regular depot stocks could not be used and subsequently replaced, for the allotments contained a clause declaring that "None of the funds herein allocated may be used to reimburse appropriations of the War Department for the value of materials on hand and used for work herein authorized * * *." It was necessary, also, to maintain the identity of each requisition throughout all stages of procurement, storage, and transfer. On procurement operations alone, this entailed placing as many contracts for the same item as there were requisitions calling for that item. Thus, quantities of an item could not be "lumped" for the efficiency and economy of bulk purchasing. In storage operations, this requirement made it necessary that depot employees segregate, on the basis of requisitions, all supplies received for defense

[5] (1) Memorandum, The Secretary of War to The Surgeon General, 9 Apr. 1941, subject: Transfer of Defense Articles to the United Kingdom (Lend-Lease Act). (2) Unless otherwise noted, the material in the remainder of this chapter is based on the following April 1946 report: Wilson, R. E.: History of Medical Department Lend-Lease Activities. [Official record.]

[6] (1) Annual Report, Finance and Supply Services, OTSG, 1942. (2) See appendix B, p. 569.

FIGURE 33.—Lend-lease medical supplies destined for China are unloaded from an American freighter at Calcutta, India, 1944.

aid. Aspirin tablets procured to alleviate headaches in the United Kingdom could not mingle with aspirin tablets purchased to achieve the same end in Russia, lest funds allocated to relieve the suffering of an English soldier should be accidentally diverted to the soothing of migraine beyond the Volga.

Another cumbersome feature of early operating procedure was the type of records it was necessary to establish and maintain, based upon those from defense aid depots, to comply with accounting requirements and to prepare the 14 reports prescribed by the Office for Emergency Management. These reports dealt with distribution of appropriations, allotments, and expenditures; analysis of expenditures; schedule of obligations; statement of defense articles transferred; property, rights, and privileges received from foreign governments; and related matters. The authority requiring these reports, apparently, had not contemplated or recognized the tremendous variety of medical items sooner or later to become involved in lend-lease operations.

Although current information was compiled on International Business Machines, preparation of the required reports became complex and time-consuming as the volume of individual requisitions grew, and quantities of individual items became so large that it was necessary to place several contracts to procure the full quantity. Moreover, since a given item appeared on many requisitions undergoing action simultaneously, extensive analysis was required to supply information on total quantities of that item or groups of related items involved in lend-lease activities at a stated time. To speed the compilation of these reports, a supplementary record was established, the material for which was accumulated by item rather than by requisition. By fall 1942, when it became possible to discontinue this record, approximately 12 full-size file drawers of 12- by 16-inch cards had been accumulated.

Only two countries, the United Kingdom and China, received aid in the form of medical supplies during 1941, and the dollar value of those transferred was small, amounting to only $276,000.[7]

The entry of the United States into the war had no immediate effect upon lend-lease operations, except that shipments were suspended briefly. This suspension lasted only 2 days for nonstandard items and 4 days for standard items. The first few months of 1942 produced no major changes in procedure; but, as the volume of transfers increased, the methods used to present and establish requirements were elaborated.

Wartime Changes

Lend-lease beneficiary governments, at the beginning of each year, submitted to the Defense Aid Sub-Division, SGO, through the International Division, ASF (Army Service Forces), estimates of total requirements for the forthcoming calendar year; and, from time to time, they filed specifically numbered "spot requisitions" for requirements which were unforeseen and therefore not included in the yearly programs. Both types of requirements

[7] See appendix B, p. 569.

were first subjected to a process of "coordination," which involved the identification of each item by reference to the Medical Supply catalog, International Aid nonstandard catalog, and other lists of medical supplies and equipment. After this coordination, the yearly programs were forwarded to the Requirements Division, SGO, for incorporation into the Army Supply Program. Although specific War Production Board clearance on the yearly programs was not required, representatives of that agency were frequently consulted for advice as to availability.

Spot requisitions were subjected to a detailed analysis upon receipt to determine the cost, the delivery schedule, and the exact quantities of critical raw materials required. The Medical Sub-Committee of the International Supply Committee discussed the requisitions and made its recommendations to the parent committee. When a requisition was thus approved, the International Division, ASF, forwarded to the Medical Department the authority to procure and transfer the medical supplies and equipment. Purchase authorizations were then prepared and sent to the appropriate procurement office, which made contracts for the required supplies. Deliveries from the contractors were made to the defense aid depot and, there, were warehoused by requisition numbers so that the identity of materials procured against each requisition could be maintained throughout the successive stages of procurement, storage, and issue. When all the material for a given requisition had been delivered, or a sufficient portion thereof to warrant a shipment, the depot notified the Surgeon General's Office, and, upon receipt of the shipping instructions requested from the foreign government, the depot was directed to proceed with the shipment.[8]

During the spring of 1942, because of the increasing volume and urgency of lend-lease requirements, efforts were begun to simplify procedures throughout the War Department. One notable result was a gradual liberalization of accounting requirements. The specific fund allocation, which required the segregation of requisitions, was eliminated; in its place, Master Procurement Authorities were substituted which were applicable to the requirements of all foreign governments approved at one time. Residues of previous fund allotments were converted into Undistributed Allocation Balance and applied to new defense aid needs. Use of surplus Army stocks was permitted, and provision was made to reimburse War Department funds. In addition, the Medical Department was authorized to include lend-lease requirements in its budget estimates, thus permitting the economic and efficient lumping and scheduling of procurement.

As the year 1942 progressed, the Medical Department was presented with spot requisitions involving large quantities of urgently needed supplies, but it was receiving few long-range programs from foreign governments on which to plan and procure against future needs. In the meantime, the Burma Road had fallen, and transport into the interior of China was at a virtual standstill. As a result, supplies procured for the Chinese account were "backing up"

[8] In 1942, the International Supply Committee superseded the Defense Aid Requirements committees.

in the defense aid depot to such an extent that warehousing by individual requisitions became physically impossible. At this point, authority was obtained to adopt more feasible methods of procedure.

In August 1942, the International Division, SGO, successor to the Defense Aid Sub-Division, recommended to the International Division, ASF, a new procedure for lend-lease medical operations. The Medical Department desired authority to establish a large stockpile of miscellaneous medical supplies, upon which it could draw in filling the spot requisitions of foreign governments. The proposal was approved in September 1942, and the procurement of approximately $60 million worth of medical supplies was promptly initiated. In compiling a list of materials for this stockpile, Medical Department officers were guided by requisitions previously received from foreign governments and by qualified technical opinion as to what would be required in the future.[9] In addition to new procurement, all materials previously procured against individual requisitions, but not yet shipped, were consolidated and placed in the unobligated stockpile, withdrawals from which were effected only by assignments receiving the approval of the Munitions Assignment Committee (Ground). This new procedure produced an important change in procurement procedure. In the future, it became possible to accumulate requisitions and to negotiate bulk contracts for the total quantities of all items needed. The new stockpile, moreover, introduced a large measure of flexibility into all Medical Department supply operations, for numerous urgent and unforeseen needs of U.S. troops were met by drawing upon this accumulation of supplies.

MILITARY AND CIVILIAN LEND-LEASE REQUIREMENTS

As early as the fall of 1942, efforts were made to distinguish between civilian and military lend-lease requirements. From the inception of the program, all requests for medical supplies had been accepted for action by the War Department and treated as military requirements, without regard to the eventual military or civilian use. This permitted the application of military priority ratings to the procurement of materials for civilian use abroad, while civilian needs in the United States received a much lower priority. After lengthy discussions between the War Department and OLLA, the latter issued an order directing that, after 1 January 1943, the two types of requirements be distinguished and treated separately. To implement this directive, the International Division, SGO, supplied figures on all unfilled requirements for medical supplies (except British requirements) and also reported stocks on hand and quantities due in from outstanding contracts.

[9] One of the supply officers later declared that the list was based on "sheer guess as to what was likely to be called for in the future." Such uninhibited frankness in official reports is rare enough to merit serious and thoughtful consideration. In the present instance, however, it appears that an excess of candor has performed a disservice to truth. Possessing more than a year's experience in supplying the needs of foreign governments, defense aid officers could base their estimates on something far more substantial than guesses. See memorandum, Lt. Col. F. C. Little, MAC, Director, International Division, to Administrative Assistant to the Chief, Supply Service, 28 July 1945, subject: Request for Specific Instances of Surplus.

In the meantime, the foreign governments filed all new requirements for calendar year 1943 with OLLA, through the International Division, ASF, and all requirements thus filed were separated into civilian and military categories. OLLA considered as 100 percent military all unfilled 1942 requirements and the 1943 requirements for Russia, China, Latin American nations, and the British forces in the field. Other British programs, as submitted by various parts of the Empire, were divided on a percentage basis. All other requirements were classified as 100 percent civilian. Stocks on hand and quantities due in from procurement were to be applied first against military requirements, with the residues to be used to satisfy civilian requirements. This comprehensive statement of requirements and assets, known as the "OLLA Control Books," was finally presented to the International Division, SGO, in March 1943. A detailed review of these books revealed some 1943 programs had not been carefully screened and that quantities obviously designed for civilian use were included as military requirements. In addition, procurement authorizations, so frequently departed from programed requirements, were forwarded at such sporadic intervals and were amended so often that, by summer 1943, not more than 25 percent of that year's requirements for medical supplies had been placed under contract. Had it not been for the stockpile authorized during the previous year, only a thin trickle of lend-lease medical supplies could have been shipped during 1943.

This unsatisfactory state of affairs provoked renewed discussions between the War Department and OLLA, and culminated in a new agreement, defining in detail the functions and responsibilities of the various lend-lease agencies.[10] In effect, OLLA was eliminated from the processing of military requirements. Its responsibility was confined to presenting civilian requirements and ordering shipment of the supplies as they became available. The International Division, SGO, was to procure military requirements and maintain any records needed to exercise this control. This change produced a distinct improvement, but important difficulties still remained. OLLA continued to issue procurement authorizations sporadically and, in some instances, for only a small part of the total civilian requirements for which approved programs had been received. The Inventory Control Branch had to deduct lend-lease civilian requirements which came up in a "buy position" under the automatic stock control procedures in effect. This cumbersome extra step was eliminated in November 1943, when the Surgeon General's Office received from the International Division, ASF, a "blanket" procurement authorization applicable to all programed civilian requirements not previously authorized for procurement.[11]

In the meantime, the OLLA Control Books had become obsolete, and a strong need was felt for a reliable and current record of total lend-lease re-

[10] Procedure for Handling Lend-Lease Medical Supplies, 11 Aug. 1943. [Official record.]

[11] Memorandum, Col. George Olmsted, GSC, Chief, Requirements and Assignment Branch, International Division, to Office of The Surgeon General (attention: Lt. Col. [Charles] Garside), OTSG, 23 Nov. 1943, subject: Lend-Lease Civilian Requirements for 1943 and 1944.

quirements. Accordingly, all known requirements, including spot requisitions and yearly programs, were submitted to the Machine Records Branch, SGO, for tabulation. The result was a consolidated listing by item, divided into 1943 and 1944 requirements, subdivided into military and civilian accounts, and coded to indicate the unfilled requirements for each item by each foreign government. This listing was then subjected to a comprehensive and detailed review by OLLA, by the International Division, ASF, and by the British Ministry of Supply Mission to eliminate any unjustified requirements. By fall 1943, the electric accounting machine listing had been thoroughly screened; and, with subsequent additions, it provided a reliable guide to lend-lease requirements during the remainder of the war.

REORGANIZATION AND REALINEMENT OF RESPONSIBILITIES

During 1943, a general reorganization of the Supply Service, SGO, eliminated duplication of functions pertaining to lend-lease and realined the International Division in its relationship with other divisions and branches.

Procedure relating to lend-lease procurement was developed in May 1943. Foreign government spot requisitions were received, analyzed, and processed by the Coordination and Analysis Branch, with assistance of the Distribution and Procurement Divisions. Availability of critical raw material and the effect on the Army Supply Program were determined by the Production Scheduling Branch of the Materiel Office, ASF. After coordination with the Distribution Division regarding the availability of surplus stock, purchase requisitions were prepared by the Procurement Division, and issue requisitions were prepared by the Distribution Division.

Electric accounting machines installed in the medical lend-lease depot eliminated the necessity for sending copies of receiving reports from the lend-lease depot to the International Division for maintaining stock records.

As the procurement districts assumed responsibility for compiling statistics for the monthly progress reports, the International Division was able to eliminate processing of procurement authorizations to the Machine Records Section as well as copies of contracts.

Responsibility for preparation of fiscal reports (DDA Forms) was transferred to the Fiscal Division, and preparation of notices of availability pertaining to shipping instructions and maintaining liaison with foreign government shipping agencies were decentralized to the lend-lease depot.[12]

By fall 1943, the Supply Service had formulated and adopted a new system of inventory control which was extended to apply to all lend-lease requirements. Under this routine, total lend-lease requirements for a 6-month period were reflected in the monthly Delivery Needs report. Where indicated, the

[12] Supply Service Memorandum No. 30, 18 May 1943, subject: Procedure Relating to Lend-Lease Procurement.

Inventory Control Branch initiated interdepot transfers into segregated military and civilian stock accounts in the lend-lease medical depot. Also, new procurement was initiated in the event of an overall stock shortage against total requirements.

Efficient operation of this system apparently was incompatible with OLLA's practice of issuing procurement authorizations sporadically and in some instances, for only partial quantities of total programed requirements. For a time, therefore, the Inventory Control Branch had to make special provision for the deduction of any lend-lease civilian requirements which came up in a "buy" position under the otherwise automatic procedures in effect. Since lend-lease civilian requirements involved the entire range of items procured by the Medical Department, this cumbersome extra step imposed a real burden on the International Division and on the procurement offices because special procurement authorization had to be initiated for the nonstandard civilian requirements.

The situation was corrected in part in December 1943, with a "blanket" procurement authorization applicable to all programed civilian requirements not previously authorized for procurement. This blanket authorization was issued by the International Division, ASF,[13] upon authorization in turn from FEA (Foreign Economic Administration), which superseded OLLA in September 1943.

Two problems in civilian lend-lease procurement still remained to be corrected. The first of these involved the fact that numerous civilian requirements for items previously allocated under the bid system, and items in short supply, had been authorized for procurement under the blanket authorization which, as it developed, had never been cleared through the War Production Board. Thus, the Army Medical Purchasing Office often was unable to place contracts for full quantities of certain items programed by FEA and, more seriously, in some instances was criticized and held accountable by the War Production Board for exceeding War Department allocations. No satisfactory solution to this problem was ever reached through discussion or agreement with FEA.

The second problem remaining to be corrected involved accountability for materials procured and delivered against requirements presented, but subsequently canceled, by FEA. This occurred frequently and introduced surpluses. Therefore, the "Procedure for Handling Lend-Lease Medical Supplies," dated 11 August 1943, was amended on 29 March 1944. Following this amendment, an allotment of FEA funds to the War Department for $68.5 million was effected to cover the entire civilian lend-lease program. Funds were made available to The Surgeon General for reimbursement on shipments made for the FEA account. Such other expenses or losses as might be incurred in the handling of procurement, storage, and issue on their behalf, including overshipments, were adjusted periodically against the allotment.

[13] See footnote 11, p. 161.

These many changes and developments gradually formed an operating procedure, within the framework of which the obligations of medical lend-lease could be discharged. By spring 1944, this procedure had been so developed that only minor changes were made during the remainder of the war.

The first important duty of the Analysis Branch of the International Division, SGO, was the identification of items requested, the insertion of proper nomenclature and stock number, and the recommendation of substitutes. After this preliminary "screening," the lists were returned to the foreign governments, which then submitted them to the International Division, ASF, as formal programs. Draft requisitions were returned directly to the International Division, ASF, for submission as formal requisitions.

Formal programs and requisitions were screened against "excesses chargeable to Lend-Lease governments" and, if appropriate excesses were not found, were submitted to the Inventory Control Branch, SGO, to determine which items would require new procurement. Items requiring procurement were submitted to the Production Division, ASF, to ascertain the availability of the quantities requested and to provide for allocation if necessary. After total costs were computed and the quantities of controlled materials estimated, the programs and requisitions were returned to the International Division, ASF, with recommendations as to the procurability and suitability of the items requested. When approved by the International Division, ASF, the quantities were added to the Army Supply Program and thus were authorized for purchase.

The final important duty of the Analysis Branch was the maintenance of the International Requirements Record. Compiled monthly by the Machine Records Branch, this record provided current information on gross requirements approved within the calendar year, by item and country, together with cumulative assignments made against these requirements. In addition, it showed a net balance due and the stocks on hand in the lend-lease military and lend-lease civilian accounts. It furnished currently adjusted lend-lease requirements to the Stock Control Division for inclusion in the Consolidated Stock Report and the Army Supply Program; and it afforded a simplified means for recording requested reductions in requirements.

The first duty of the Assignments Branch was registry of requisitions and programs to identify them in the process of assignment and shipment. An SGO shipping order number was given to each new requisition or program, and the number thus given became the permanent file reference for the requirement.

This branch also determined and presented bids for available stock before the medical subcommittee of the Munitions Assignment Committee (Ground). A monthly military International Requirements Record was compiled, which showed the bids of each beneficiary government. At the subcommittee meeting, these bids were routinely approved when stock was available to satisfy all claimants; but, when the supplies were inadequate to meet all unfilled require-

ments, the subcommittee allocated the available stock on the basis of urgency of need. A copy of the International Requirements Record was transmitted to the Munitions Assignment Committee (Ground), which authorized the transfer of the supplies to the foreign governments.

The Assignments Branch then prepared the necessary shipping orders, posted them to sequence records for permanent cross-reference, and transmitted them to the appropriate depots for action. At every stage of the shipping process, the Assignments Branch received information on the shipments and maintained comprehensive records on them. It was possible, therefore, to respond to inquiries from beneficiary governments without frequent reference to depots and ports.

The foregoing procedure was confined to military lend-lease shipments. The Medical Department had ceased to have any responsibility for civilian lend-lease, except to act as a purchasing agent for FEA. Early in 1944, it became apparent that even this limited responsibility was interfering with duties which were more closely related to the winning of the war. The Foreign Economic Administration had presented to the Medical Department a program involving the purchase of $66 million worth of medical supplies, which were pouring into the depots from contractors' plants with little likelihood that the bulk of it would move out before the end of the war. There was, moreover, reason to believe that relief requirements would grow with the passage of time, that they would continue beyond the war period and would burden the Military Establishment while it was undergoing demobilization. The War Department proposed, therefore, that all responsibility for the procurement, storage, and issue of medical supplies programed by FEA be transferred from The Surgeon General to appropriate civilian agencies not later than 31 December 1944. The general terms of this proposal were promptly accepted by FEA, with reservations as to the time limit, and representatives were named by the agencies involved to formulate plans for the transfer.[14] Protracted delays by FEA then ensued, which were finally ended in the fall of 1944. At that time, the War Department forced the issue by announcing that additional civilian requirements necessitating new procurement would not be accepted, and proposing to release one of its medical depots to FEA.

Negotiations were begun promptly, and basic agreements were soon reached. Commencing on 15 October 1944, the shipment of all medical supplies programed by FEA for civilian rehabilitation would be called forward through the Procurement Division, U.S. Treasury Department. Shipments to actual participants in the civilian lend-lease program would be handled, as in the past, on FEA shipping orders. New civilian requirements of any type would be referred to the Treasury Department for procurement although the War Department would screen the requirements and would accept any portion

[14] (1) Letter, Maj. Gen. Lucius D. Clay, GSC, Director of Materiel, ASF, to the Hon. Leo [T.] Crowley, Foreign Economic Administration, 11 Mar. 1944. (2) Letter, Mr. Leo T. Crowley, Administrator, Foreign Economic Administration, to Maj. Gen. Lucius D. Clay, 23 Mar. 1944.

that could be filled from excess stocks. The Medical Department would release a suitable depot, complete with equipment and civilian operating personnel, to the Treasury Department as operating agent for FEA.

PROBLEMS OF LEND-LEASE ADMINISTRATION

After extensive negotiations, the Toledo Medical Depot, Toledo, Ohio, was declared surplus and was transferred to the Treasury Department, effective on 1 May 1945.[15] During the interim from November 1944 to May 1945, the Medical Department continued to operate the depot, but Treasury Department representatives were assigned to participate in its administration, pending the actual transfer of accountability and title. An extensive assembly program for civilian rehabilitation was continued at Toledo until the end of December 1944. Since the depot was to be transferred to the Treasury Department in May 1945, it became necessary to clear Medical Department stocks from the warehouse areas and to replace them with FEA stocks then in the Louisville Medical Depot. This transfer was first estimated to involve the movement of 1,200 to 1,500 carloads, but a "paper transfer" of stocks greatly reduced the size of the contemplated movement. FEA supplies at Louisville were credited to the Army or military lend-lease accounts while Medical Department supplies at Toledo were transferred to Treasury Department accountability. After these paper transfers were made, the movement of only 800 carloads of supplies completed the transfer and relieved the Medical Department of all responsibility for civilian lend-lease just a few days before the end of hostilities in Europe.[16]

The administration of lend-lease was a "war baby" without antecedents and, so far as anyone could tell, without hope of posterity. It was born and grew to maturity within the short space of 4 years. For the expansion of the Army and the waging of a war beyond the seas, precedent and experience offered some guide. But lend-lease was without precedent. It was constructed by inexperienced hands to meet pressing and changing needs. The result was an almost continuous establishment, revision, rescission, and reestablishment of offices and policies, in and out of the War Department, which appeared frivolously inconsistent to those at the lower operating levels.

Excessive Foreign Requirements

There is reason to believe that some countries looked upon medical lend-lease as a grab-bag filled with gifts for the needy. In the early days before any distinction between military and civilian requirements was recognized, all lend-lease materials were procured under a military priority. This created in beneficiary governments a strong temptation to fill civilian needs which were un-

[15] Army Service Forces Circular No. 164, section VI, Installation, 8 May 1945.

[16] It should be noted, however, that a large quantity of supplies was held at Louisville to maintain an uninterrupted flow of civilian lend-lease shipments. FEA had given assurances that these supplies would be "called forward" before 31 December 1944, but as late as September 1945, approximately 500 tons still remained in the FEA stock account at Louisville.

FIGURE 34.—Planes at Gali Morgheh Airport, Tehran, Iran, used for air shipment of supplies and equipment from the United States to Russia, 11 April 1944.

connected with military operations. Even after the division of military and civilian requirements, occasional abuses occurred which left the impression that the United States was looked upon as a lush source of material wealth. For example, the U.S.S.R. continued throughout the war to enjoy a 100 percent military classification on all her requirements, receiving tremendous quantities of many items which were designed primarily for civilian use (fig. 34). Objections by the International Division were promptly overridden by higher authority. During 1943, Australia was allowed to classify her artificial teeth requirements as 100 percent military. She asked for, and received, a quantity in excess of total U.S. Army issues for that year. When it is considered that the total population of Australia was somewhat smaller than the U.S. Army, it is probable that the 1943 shipments amply supplied the Australian forces with artificial teeth. However, that country promptly submitted another requisition for the following year's needs, which were estimated at 75 percent of the quantity received in 1943. The second requisition was disapproved on the recommendation of the International Division, SGO.[17] The British had a 100 percent military classification for all requirements of X-ray equipment until late in 1944 on the strength of the argument that their distribution system did not permit segregation for military and civilian use. Since much of this equipment was of an elaborate type not essential for military use, the International Division interposed vigorous objections and was finally able, in July 1944, to distinguish civilian from military requirements. At this time, the American X-ray industry had on its books domestic civilian orders 16 months

[17] Memorandum, Lt. Col. Charles Garside, Director, International Division, OTSG, to Director, International Division, ASF (attention: Col. George Olmsted, GSC), 8 Dec. 1943, subject: "Adjustments" in UK Programs.

old and commercial export orders antedating Pearl Harbor, while British civilians were enjoying an AA–1 military priority for their X-ray needs.

In seeking to obtain lend-lease medical supplies in excess of military requirements, the Republic of Ecuador proved that small nations can nourish large hopes. That country presented a 1943 military program requiring medical supplies and equipment for 50 infantry and 20 cavalry divisions. This ambitious program was disapproved, and plans were made to provide a quantity of medical supplies more directly related to the size of Ecuador's Army—five divisions.[18]

Differences in Terminology

Another major problem in early lend-lease operations resulted from wide variations in medical practices, customs, and terminology throughout the world. The identification of some items required by the beneficiary governments was extremely difficult because of language barriers, inadequate specifications, and inability of representatives of foreign governments to discuss and agree upon technical interpretations of stated requirements. This was especially troublesome in screening Russian requirements; the Soviet Mission usually insisted upon materials being furnished exactly as requested although the technical description of the desired item was meaningless to American officers and the Russian officials were unable to furnish clarification (fig. 35). When additional information was received which suggested the advisability of substitutes, the Soviet Mission was reluctant to approve the changes. During the last 18 months of lend-lease operations, several competent Russian physicians were assigned to the Soviet Mission. This change produced a distinct improvement although relations were far from perfect at the war's end.

After the items were identified, other difficulties which were related to the variety of medical practices, developed. There were requirements for large quantities of medicines and equipment which were difficult to procure, either because such supplies were obsolete in the United States or because they had never been produced and used in great volume. Very little calomel was used by American troops, but tremendous quantities were procured and shipped to foreign governments. Although widely used in the United States, insulin was employed in far greater quantities abroad. In X-ray equipment, the same problem was encountered. On one occasion, the Russian Government requested 3,000 X-ray tubes of a type which had not been manufactured in the United States for 25 years. Since it was obviously impractical to tool up a factory to

[18] Memorandum, Lt. Col. Charles Garside, Director, International Division, OTSG, to Director, International Division, ASF (attention: Col. George Olmsted, GSC), 30 Sept. 1943, subject: Ecuador 1943 Military Program. In discussing the abuses of medical lend-lease, the author has been aware that the maintenance of civilian health and well-being is related to military operations and that it is sometimes difficult to distinguish between military and civilian use. But even after the fullest allowances are made, it is apparent that large quantities of lend-lease medical supplies were diverted to uses which were only faintly connected with military operations.

FIGURE 35.—U.S. ship lined up at Khorramshahr docks in the Persian Gulf Command ready to discharge supplies and equipment. Although such convoys carried supplies for U.S. forces in the command, the bulk of cargo was lend-lease material for Russia.

produce these obsolete tubes, a new type was shipped which, it was thought, could be used in the Russian machines.[19]

In the Medical Department supply catalog, approximately 7,000 standard items were listed, but even this collection of medical supplies and equipment was inadequate to cover the needs of lend-lease governments. It became necessary to compile an "International Aid Non-standard Catalog," consisting of items employed for medical purposes but not standard with, and not used by, the Medical Department.

The whole problem was pointedly summarized by Lt. Col. Francis C. Tyng, MC, in October 1942. "After all," he wrote to Brig. Gen. Paul R. Hawley, "the United States is the last remaining bastion of medical supply and it must supply all the Allies in the world, but it cannot continue to fill the unconscionable demands of the Allies and at the same time leave anything for

[19] Address, Brig. Gen. Edward Reynolds to Medical Department officers assembled at Walter Reed General Hospital, 19 Sept. 1945, subject: Medical Supply Problems of World War II. [Official record.]

our own armed forces, to say nothing of our civilians. You can easily see that we are heading into a catastrophic situation." [20]

OTHER RELIEF ACTIVITIES

In addition to the administration of lend-lease medical supply activities, the International Aid Division also handled medical supply activities for the Russian War Relief Society and for the American Red Cross. In August 1944, the latter function was transferred to the Liaison Branch, Purchases Division.

Activities on behalf of Russian War Relief and the American Red Cross involved accounting of special funds provided for the purpose, with the consequent necessity of maintaining the identity of separate requisitions throughout the stages of procurement, storage, and issue. Medical supplies in the common lend-lease stockpile were not authorized to fill these two agencies' requirements. Use of Army stocks excess to current requirements, however, was provided; specifically, requisitions in these categories were forwarded through the Liaison Branch to the Stock Control Division for stock transfers or procurement as necessary. Reimbursement from funds allocated to the War Department (for Red Cross shipments) or from funds on special deposit with the War Department Finance Officer (for Russian War Relief shipments) was obtained by the Fiscal Division, SGO, on the basis of actual shipping documents.

[20] Letter, Lt. Col. F. C. Tyng, MC, to Brig. Gen. Paul R. Hawley, 18 Oct. 1942.

Part II

MEDICAL SUPPLY IN THE WAR AGAINST THE EUROPEAN AXIS

CHAPTER VII

Outposts and Supply Routes

By the time the United States entered World War II, specific theaters of operations, commands, and lines of communication already had been established in the interest of national defense, and to implement the program of aid to Britain (map 1). From the point of view of medical supply, these commands came at an inopportune time because their activation, coinciding as it did with the mushrooming of military installations in the United States, widened the gap between availability and requirements for both personnel and materiel.

NORTH ATLANTIC BASES

In September 1940, the United States obtained base sites at several British possessions in the Atlantic (map 2) and Caribbean areas. Although the Lend-Lease Act was not signed until 27 March 1941, U.S. troops began occupying these bases in January of that year.[1] Medical service for the arriving troops was initially under the supervision of the Corps of Engineers, who was also responsible for the health of civilian construction workers. Preliminary surveys to determine medical needs were made under the direction of Col. (later Brig. Gen.) Leon A. Fox, MC.

Newfoundland Base Command

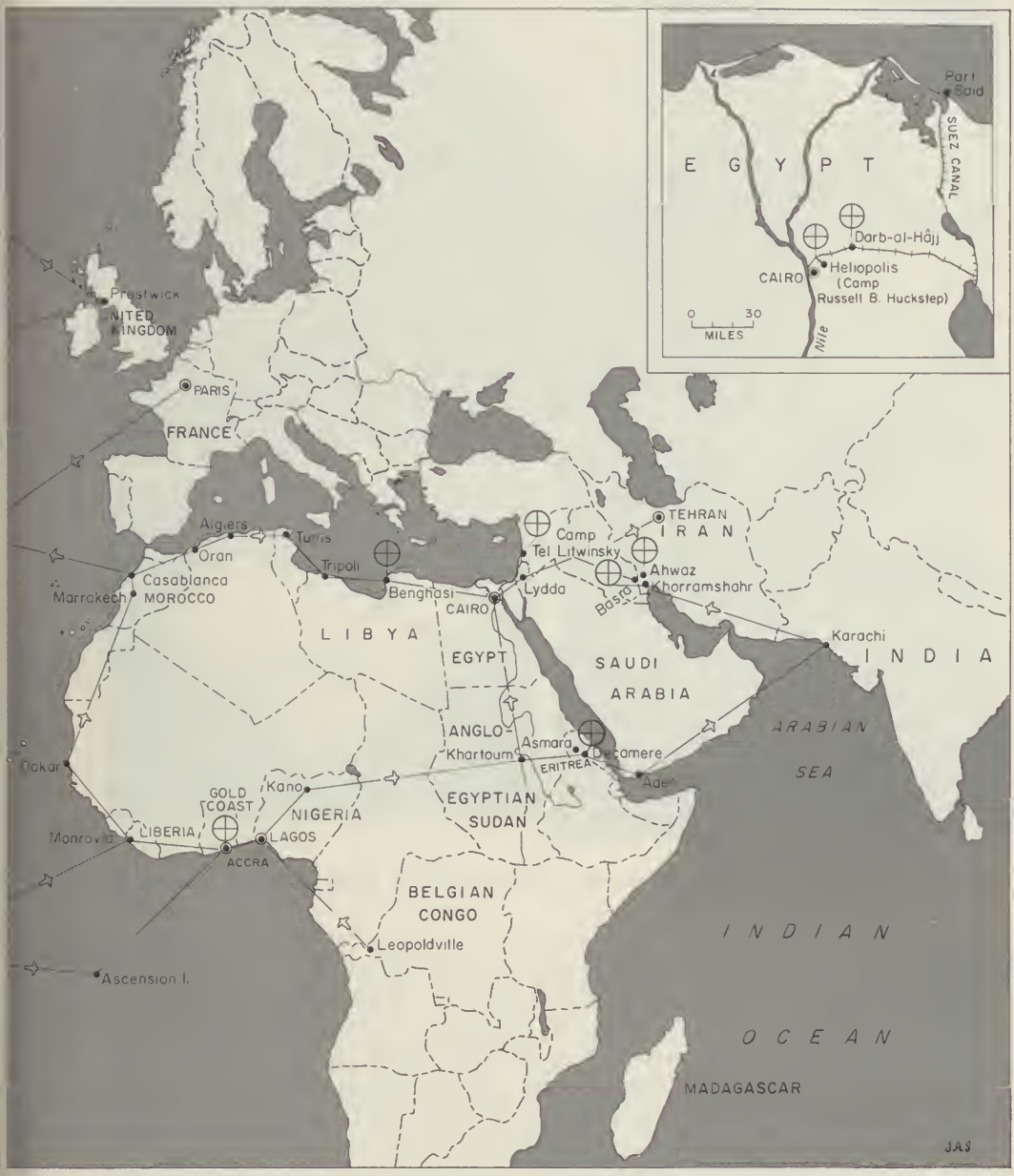
The station hospital, Newfoundland Base Command, was activated on 15 January 1941, aboard U.S. Army Transport *Edmund B. Alexander*. Before sailing from the Brooklyn Port of Embarkation, medical supplies were carefully examined, segregated from nonmedical supplies, and made readily accessible for use upon arrival in Newfoundland.[2] Shortly after arrival of the transport at the port of St. John's on 29 January 1941, it was discovered that no cassettes for chest X-rays were available. This situation was quickly remedied by the loan of two such cassettes from health authorities of St. John's.

When the USAT *Edmund B. Alexander*, which had been serving as the station hospital, Newfoundland Base Command, was ordered back to its base in Brooklyn, N.Y., it became necessary to find temporary accommodations un-

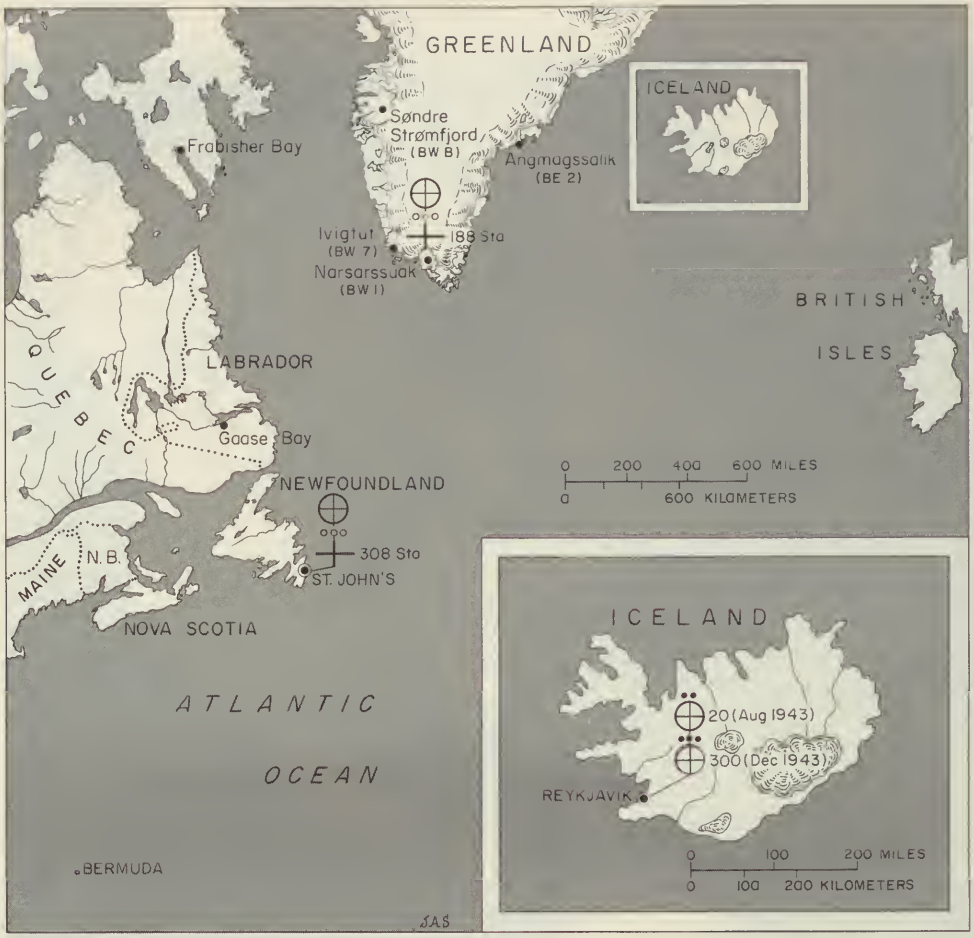
[1] (1) Conn, Stetson, and Fairchild, Byron: The Framework of Hemisphere Defense. United States Army in World War II. The Western Hemisphere. Washington: U.S. Government Printing Office, 1960, pp. 51–62. (2) Wiltse, Charles M.: The Medical Department: Medical Service in the Mediterranean and Minor Theaters. United States Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1965, p. 9.

[2] This section, unless otherwise stated, is based on the following documents: (1) Annual Report, Station Hospital, Newfoundland Base Command, 1941. (2) Annual Report, Newfoundland Base Command, Part II: Fort Pepperrell, 1942. (3) Annual Reports, 308th Station Hospital, 1943 and 1944.

Map 1.—Supply routes to Europe,



Africa, and the Middle East.



Map. 2.—Medical supply installations in Newfoundland, Greenland, and Iceland.

til a permanent hospital could be erected. Accordingly, a large country estate, Northbank, was rented and remodeled to serve as a temporary hospital.

The assembly for a 50-bed hospital, which had arrived before the move to Northbank, remained stacked high on the pier at St. John's because of lack of storage space. Some remodeling of the estate was accomplished by construction of a temporary 25-bed ward, and by 5 June 1941, the station hospital, Newfoundland Base Command, had completed its move into the Northbank estate. Supplies were stored in outhouses and other temporary storage spaces. The hospital moved in December to newly completed barracks at Fort Pepperrell, where it remained until its own building was ready in June 1943. It had been redesignated the 308th Station Hospital in April of that year.

The medical supply unit of the 308th Station Hospital was established as the medical supply depot for the entire Newfoundland Base Command, and eventually supplied four hospitals totaling 450 beds. This supply operation con-

FIGURE 36.—Panoramic view of Fort Pepperrell, Newfoundland, across Quidi Vidi Lake, April 1942.

tinued in a dual capacity until 12 August 1942, when it was separated from the hospital and designated the Medical Supply Office, Newfoundland Base Command. This office, which had the function of coordinating the medical supply activities for the entire base command as well as furnishing medical supplies for the station hospital at Fort Pepperrell, was organized into an administrative section, a receiving section, and an issue and shipping section. The inadequate storage facilities at Northbank were replaced in December 1942 with better facilities located at Fort Pepperrell (fig. 36) in the basement of the detachment barracks in the new hospital, and in a permanent warehouse.

Although medical supplies were adequate for most of the Newfoundland Base Command, the system of automatic supply in some instances produced more or less than enough. For example, the surgeon of the station hospital, Newfoundland Air Base (Gander Field), reported overstocking of drug items. On the other hand, shortages soon developed in such vital supplies as utensil sterilizers, water sterilizers, distillation apparatus, and field X-ray equipment, none of which were on automatic supply.[3]

Because it was originally planned to use Eskimo dogs in tactical training in Newfoundland, great quantities of veterinary supplies and equipment were received and suddenly became surplus when the project was abandoned. The excess supplies were eventually returned to the Zone of Interior when it was realized that they would not be used and were occupying needed storage space.

Base medical supply levels were set at 75 days maximum, plus order and shipping time of 75 days, and levels for each of the other three posts within

[3] Annual Report, Station Hospital, Newfoundland Air Base, 1942.

the command were 40 days maximum, plus the 75 days' shipping time. Most excesses which had accumulated in the command were occasioned by automatic supply of medical maintenance units, which system was not displaced by requisitioning until 1 December 1943. The ill effects of automatic supply were compounded by the fact that medical maintenance units were designed for combat operations and contained quantities of items that far exceeded the needs of the command. Excesses were periodically reported and consolidated for return to the Zone of Interior.

Initially, all medical supplies were received and distributed by the base medical supply depot, but this was changed later when all requisitions were filled to the extent of available stocks by the depot, and remaining items were extracted to the Boston Port of Embarkation for direct shipment to requisitioning units. The command considered this the most practical method of supply as it eliminated double handling and overstocking. Obversely, the War Department viewed the method as fostering overstockage, particularly at outlying stations, and precluding central control. The command was directed to revise its goals. The new system, inaugurated on 1 January 1945, resulted in requisitions to the port sufficing for stockage of the base depot and for issue to using units.

The command resisted the change to a centralized requisitioning system because it had been able to curtail its medical supply activity to a greater degree than the reduced command strength indicated, dropping from 13 civilian employees in January 1944 to 0 by December of that year when the base depot was inactivated. Moreover, the military personnel assigned to supply had been released, and a substantial portion of the medical warehouse space had been closed out. With the inauguration of central requisitioning, it was necessary to revise the curtailment of supply operations despite the progress that had been made in reduction of forces.

Bermuda Base Command

Contrasted to the bleakness and cold climate of the Newfoundland Base Command, the Bermuda Base Command, located in a more temperate area, also served as a link in overseas communication and as a defensive post for the hemisphere. Established in April 1941, the Bermuda Base Command experienced problems of supply because of its crowded facilities. Medical supplies were stored in two rooms on the ground floor of the 221st Station Hospital, which occupied the Castle Harbour Hotel.[4]

In May 1943, the hospital was transferred to a partially completed building at Fort Bell (fig. 37), and supply facilities, similar to those in the previous location, were established.

[4] This section is based on the Annual Reports of Bermuda Base Command for 1941, 1943, and 1945.

FIGURE 37.—U.S. Army Hospital, Fort Bell, St. David Island, the storage facility for medical supplies in Bermuda.

During 1944, 24 long tons of excess medical supplies were returned to the States. Air-conditioning units were installed in operating rooms, X-ray rooms, and in one recovery room.

The common complaint of the Bermuda Base Command concerning medical supply was that intervals between freight transports prevented prompt filling of their requisitions made to the New York Port of Embarkation. However, as with the other bases and stations servicing the various air routes of communication, emergency medical requirements, supplies, and patients were air delivered to their destination rapidly.

Eastern and Central Canada

Bases located in eastern and central Canada were important links in the North Atlantic Ferry Route. Traffic over this route reached a peak in 1944, when 8,641 aircraft were ferried to Europe.[5] Medical facilities in eastern and central Canada ranged from dispensaries at tiny weather stations, such as

[5] Dziuban, Stanley W.: Military Relations Between the United States and Canada, 1939–1945. United States Army in World War II. Special Studies. Washington: U.S. Government Printing Office, 1959, p. 191.

Southampton Island, Padloping Island, and River Clyde, to station hospitals at the key ferrying points of The Pas, Fort Churchill, Frobisher Bay, and Goose Bay.

Because of the extreme isolation of most posts in eastern Canada, supplies were shipped by water during the few summer weeks that the shipping lanes were open, or by air in an emergency. Ships sailing from the Boston Port of Embarkation to Goose Bay, Frobisher Bay, and other points carried a 360-day level of expendable supplies as well as a 450-day level for maintenance items found in the 30-day unit for 10,000 men.[6] In central Canada, distribution of medical supplies to the isolated weather stations during the summer months was necessary because of the extremely bad weather during the rest of the year. Items contained in these shipments were limited to first aid and emergency treatment essentials and certain drugs needed to treat common ailments.[7]

The most serious supply problem encountered in eastern and central Canada was that of dealing with surpluses. By March 1944, the 4th Station Hospital at Churchill and the 131st Station Hospital at The Pas were transferred from the theater and replaced by dispensaries. Thus, a surplus of supplies existed for some time.[8]

During 1945, the anticipated inactivation of the U.S. forces in central Canada caused a flurry of inventorying and adjustment as well as reorganization. The supply policies, despite this hindrance, worked particularly well on Southampton Island, where the post surgeon performed a successful emergency appendectomy only 15 days before the arrival of the ship which was to evacuate supplies and equipment.[9]

Greenland Base Command

Following an agreement with the recognized Danish Minister in Washington, D.C., U.S. troops landed at the head of Tunugdliarfik Fjord in southern Greenland on 6 July 1941. Included in the first contingent of troops were 2 medical officers and 14 enlisted men of the Medical Department.[10]

The first medical facility, located at Bluie West No. 1, was a first aid tent. In the interval between the arrival of this group and the completion of the original hospital building in October 1941, the 10-bed, field-type hospital moved from place to place. Upon completion of the building, facilities rose to 20 beds.

The second Greenland post, known as Bluie West No. 8, was established at the head of Søndre Strøm Fjord about 15 miles north of the Arctic Circle

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[6] Annual Report, U.S. Army Forces in Eastern Canada, 1943.

[7] Essential Technical Medical Data, Air Transport Command, North Atlantic Wing, for May 1944, dated 31 May 1944.

[8] Essential Technical Medical Data, U.S. Army Forces in Central Canada, for February 1944, dated 6 Mar. 1944.

[9] Essential Technical Medical Data, U.S. Army Forces in Central Canada, for August 1945, dated 18 Sept. 1945.

[10] This section is based on Annual Reports of the Greenland Base Command, 1941–44.

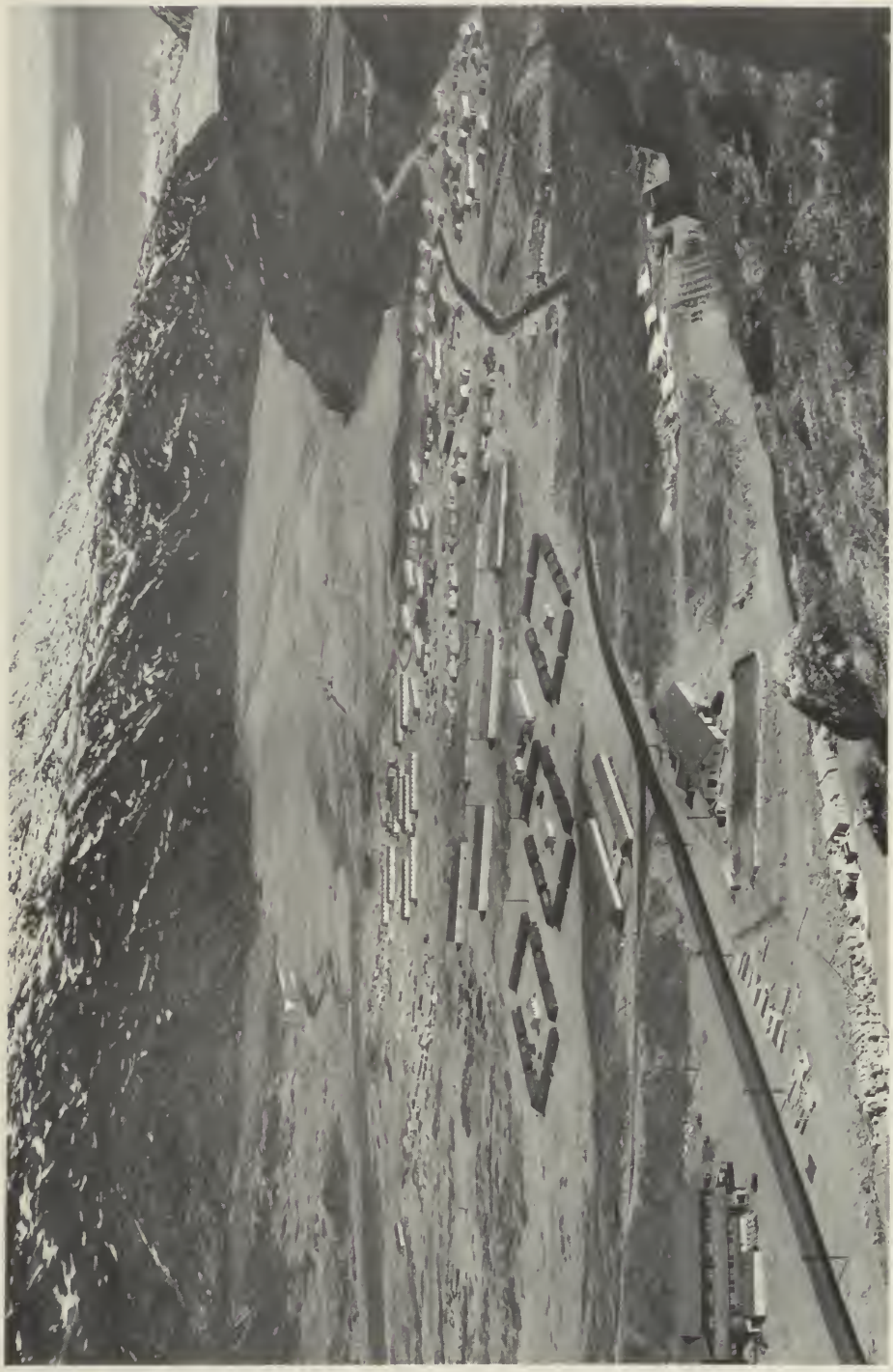

FIGURE 38.—Army and Navy area, Greenland Base Command, which included the 188th Station Hospital, May 1943.

(maps 1 and 2). Dispensaries were set up under tentage and, by summer 1942, had grown into overcrowded, improvised hospitals. In September, the War Department authorized activation of four numbered station hospitals and construcure was begun. Equipment arrived more quickly than the building materials. By the end of 1942, approximately 85 percent of the needed supplies were on hand, but the buildings were not completed for another year.

Medical supplies for the Greenland Base Command came by way of the Boston Port of Embarkation. The supply officer of the 188th Station Hospital (fig. 38) acted informally as the base medical supply officer, supplying outlying posts, absorbing excess stocks, and redistributing stocks as needed at other installations. Equipment and supplies were generally adequate. The automatic shipment of medical maintenance units actually resulted in a surplus of many items, but little or no corrective action was taken by medical supply officers, who lacked time to handle this particular problem. These surpluses had accumulated from the original 6-month supply and resupply items, which had been shipped to each hospital. Not until after discontinuance of automatic shipment in December 1943 did Medical Administrative Corps officers, available only since May 1943, set up the stock records and systematic procedures that enabled the command to institute a monthly requisitioning system and to dispose of excesses.

Few medical supply difficulties were reported during the war despite hardships of the climate and the long winter nights. There was some indication, in fact, that the Surgeon General's Office became overzealous in catering to the needs of this isolated command. It was reported in mid-1943 that 50 to 75 packages per month were being received by airmail parcel post, while freight shipment would have sufficed for the majority.

As a result of excessive requisitioning, and a change in the table of organization of the hospital, a total of 314,600 pounds of surplus medical supplies was returned to the United States in 1944.

Iceland Base Command

In the middle of September 1941, the first contingent of Army troops arrived in Iceland (figs. 39 and 40), reinforcing a Marine task force that had itself reinforced a British garrison in July. Medical supplies, initially, were handled by 2 officers and 25 enlisted men, who set up a depot in two warehouses in Reykjavík. Adequate space (8,000 square feet) was available, but the lack of elevators and the distance from the docks made normal depot operations difficult. Although 6 officers and 75 enlisted men were authorized for supply duty, that number was never reached.

By the end of 1942, the supply system was being effectively operated by 4 officers and 50 enlisted men.[11]

[11] This section is based on the Annual Reports of the Iceland Base Command for 1941, 1942, and 1944.

FIGURE 39.—Placing medical supplies and equipment under tarpaulin at Langhold Dump, Iceland, October 1941.

Besides the main supply depot in Reykjavík (map 2), some supplies were located in an original package storage depot at Yeomanry Camp and in a subdepot at Camp Ontario in the Alafoss subsector. The latter consisted of three 20- by 48-ft. huts, with a total floor space of 2,880 square feet; the package storage warehouse had a floor space of 4,000 square feet. The medical supply was separated into main depot and subdepots to facilitate dispersal of supplies more easily and conveniently.

All medical units maintained a minimum of 90 days' level of supplies, and certain isolated units maintained a level of 120 to 180 days. From the beginning, replacement supplies were acquired by automatic supply of medical maintenance units supplemented by command requisitions. Controlled items were supplied automatically against the command's monthly material reports to the Zone of Interior. By early April 1943, the automatic supply medical maintenance units led to an unbalanced stock position. Supplies such

FIGURE 40.—An early, temporary, and rather primitive dispensary in Iceland.

as quinine and mosquito bars particularly were received in excess, and were returned to the Boston Supply Depot.

The Iceland Base Command reached a peak strength of more than 40,000 troops in May 1943, but the threat to the Western Hemisphere that had led to the occupation had already passed. Troop strength was cut back by 25 percent in August and continued to decline thereafter, with corresponding decreases in the number of hospital beds. The medical supply system was also reorganized, passing to a base depot section of the 20th Medical Depot Com-

pany in August 1943, and in December of the same year, the 300th Medical Composite Platoon.

Medical supply levels did not fall as rapidly as troop strength, in spite of the shipment of almost 2.5 million pounds of surplus items to the United Kingdom during 1943. Further reductions the following year were necessary to achieve the 30 days' operating and 30 days' maintenance supply levels. By the middle of 1944, depots and issue points remained only in Reykjavík and at Keflavik, adjacent to Meeks Field, principal Iceland base of ATC (Air Transport Command).

CARIBBEAN DEFENSE COMMAND

In early December 1941, a total of 66,000 U.S. troops were deployed in the Caribbean area to protect the vital lines of communication from a German submarine threat, and to repel any possible Japanese attempt to attack the Panama Canal. Expansion was rapid during 1942, when the Panama Canal Department alone had more than 68,000 troops. The Puerto Rican and Panama Canal Departments were the major elements for supply until May 1943, when the Antilles Department was formed. The latter's aggregate strength at that time was approximately 55,000, but strength in the Panama Canal Department was then declining.[12]

Organization for Medical Supply

The medical supply functions of the Caribbean Defense Command (map 3) were carried out primarily at departmental level until May 1943. One reason for this was the need for relatively independent sources of medical supply for each, in view of the possible isolation that might attend sea surface and submarine warfare against shipping. Another factor was implicit in the expansion of the Caribbean Defense Command, which assumed an active role neither department had been equipped in the prewar years to carry out.

It is noteworthy that the problems of medical supply were comparatively greater in the Antilles Department than in the Panama Canal Department. Among others, two primary factors conditioned the difference: first, the Panama Canal Department was much better established in 1939, and second, the extreme dispersion within the Antilles Department was a definite handicap.

Panama Canal Department

In late 1940, the medical supply depot for the Panama Canal Department consisted of 19,000 square feet of storage space at Fort William D. Davis. This space had been adequate for prewar years, but the possibility of the disruption of transportation by air attacks on the Canal Zone necessitated larger facilities. Freight movement within the Panama Canal Zone was best handled

[12] A History of Medical Department Activities in the Caribbean Defense Command in World War II, vol. I. [Official record.]

MAP 3.—Medical supply depots in the

Caribbean Defense Command, 1941–45.

by a single-track railroad or by ship via the canal. Both routes were considered attractive targets. Because of this potential danger, it was decided to disperse stocks for safety and to provide sources of medical supply on both the Pacific and Atlantic sides of the Canal Zone.[13]

Early in 1942, although there was an acute shortage of nearly all classes of medical supplies, the establishment of the automatic issue of supplies worked out especially well. A few items were found to be in excess, and some were issued in amounts slightly below requirements, but adjustments were made with the medical supply officer at the New Orleans Port of Embarkation.[14]

On 1 April 1943, a new medical supply warehouse, measuring 40,000 square feet, was completed at Corozal. Thus, two medical supply sections—the Atlantic and Pacific—were functioning simultaneously until 1944, when stock control was transferred from the Atlantic Branch Medical Depot, and the Corozal General Depot became the dominant installation. The Fort Davis Depot simply became a medical warehouse section of the Corozal General Depot.

The outstanding accomplishment of medical supply activities for 1944 was the establishment of rigid stock control procedure, effective on 1 July 1944; all station medical supply functions were placed on a formal accountability basis. After a complete inventory was taken, new stock record cards were initiated, and a requisitioning objective of 165 days was established for the entire department, with a 46-day level set up for the stations. All excesses were returned to the medical sections of the general depots, and all items not required for depot stocks were returned to the Zone of Interior. A total of 124,480 cubic feet of excess material was returned during the period 1 January–11 December 1944. The established stock levels worked ideally and distribution was without interruption.

Well-trained X-ray and dental repair technicians in the department rendered invaluable assistance in the repair of appliances and equipment even though spare parts were not always available.

The most serious problem in Panama was the deterioration of equipment. The struggle against termites, rust, chemical decomposition, and corrosion was continuous because of the high humidity of the area. X-ray films were received improperly packed and, as a result, cloudiness developed on the film. This condition was corrected by the development and use of a "tropical pack film." Metal instruments had to be specially processed, and certain biologicals had to be refrigerated under controlled conditions. Items that were particularly susceptible to the effects of humidity were stored in a "dryroom" constructed for the purpose at the Corozal depot.

Preplanning in the closing days of World War II produced two outstanding accomplishments: 24-hour-a-day emergency supply service to redeployment

[13] A History of Medical Department Activities in the Caribbean Defense Command in World War II, vol. III. [Official record.]

[14] This section is based on the following documents: (1) Annual Reports of Panama Canal Department for 1942, 1944, and 1945. (2) Annual Report, 262d General Hospital, Fort Clayton, Canal Zone, 1944.

troops passing through the canal, en route to Pacific theaters; and complete and prompt delivery of all such emergency requisitions to the ship by medical section transportation and personnel through use of advanced requisitions on the States.

The closing of the Atlantic Branch Medical Depot at Fort William D. Davis on 5 September 1945 caused the transfer of the supplies and equipment to the Corozal General Depot. This move released 40,800 square feet of warehouse space located in two buildings. Equipment and certain personnel were released as well. During 1945, 13,286 cubic feet of excess supplies were returned to the Zone of Interior, and 1,819 cubic feet were disposed of through lend-lease.

Puerto Rico

The medical section of the Puerto Rican General Depot was activated on 1 September 1940 and functioned through the Medical Supply Office, port of San Juan, P.R., until 2 October 1940, when it was moved to Fort Buchanan and assigned 50,000 square feet of storage space. From a staff of 1 officer, 5 enlisted men, and 6 civilians in 1940, the organization expanded by 1943 to include 3 officers and 13 enlisted men.[15]

Trinidad Base Command

The Medical Supply Section of the Trinidad Base Command was first established in May 1941. As the sector grew and other bases were established, this became a large facility.

By December 1942, a medical section was established in the Trinidad General Depot, from which medical supplies for the whole sector were handled. Housed in new warehouses in the Fort Read area, the depot reached its peak of requisitioning in mid-1943, and by fall of that year, excess stocks were being returned to the United States.[16]

Reorganization of the Medical Supply System

After the Antilles Department[17] was created in 1943, the medical supply system underwent a complete reorganization, brought about by the changing tactical situation and the improvement of shipping schedules. There were several major changes in supply organization and procedure. Requisitions for medical installations in Jamaica and Cuba were submitted directly to the New Orleans Port of Embarkation. All classes of medical supplies were ordered on a monthly basis instead of periodically as needed. The supply organization was divided into the Trinidad Sector and Base Command, and the Puerto Rican Sector.

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[15] See footnote 13, p. 188.

[16] Annual Report, Medical Department Activities, Trinidad Sector and Base Command, 1943.

[17] This section is based on Annual Reports of the Antilles Department for 1943, 1944, and 1945.

The stock record system for all stations in the Antilles Department was changed in 1943 by the incorporation of a department surgeon's office memorandum with the stock control manual. New practices for maintaining a stock level were also introduced.

Disposal of excess stock was handled well by circulating a list of items throughout the department. Extracted items were shipped without reimbursement. A total of 232 tons of excess items was shipped out in November 1943, and 86 more tons were reported ready for shipment in December. In January 1944, new stock levels were established for the Trinidad Sector and Base Command and for the Puerto Rican Sector, and arrangements were made to transfer surplus material to the Navy or to the Public Health Service.

The Optical Repair Team Type No. 1, formerly located at Waller Field, Trinidad, was moved to the Antilles General Depot in May 1944. This unit began handling requests for lenses which had previously been referred to the Zone of Interior. In addition, the facilities and services of the optical repair team were made available to the U.S. Navy and Coast Guard. In 1944, more than 1,700 requests were handled by the team.

The main responsibility for supplying the island outposts of the Antilles Department rested with the Trinidad General Depot, which was redesignated Sub-Depot, Antilles General Depot, in April 1944. This depot supplied the St. Lucia Base Command, British Guiana Base Command, French Guiana, the Trinidad Base Command, and Surinam (including Zanderij Field). The use of this subdepot greatly reduced time in filling requisitions.

As of 31 December 1944, 2,164 tons of excess medical supplies were returned to the Zone of Interior.

Repair facilities for Medical Department equipment in the Antilles Department were not satisfactory before 1945. The medical section of Antilles General Depot No. 1, Puerto Rico, had been using civilian personnel, but low civilian ratings hampered the hiring of adequate personnel. The situation was similar in the area served by the medical section of Antilles General Depot No. 2, Trinidad. Repair could be accomplished only on minor items; often, complete replacement was necessary on units and assemblies which became unserviceable and could not be repaired locally.

An effort was made in late 1944 to establish a medical repair section which would accomplish third and fourth echelon maintenance. Enlisted men were sent to the St. Louis Medical Maintenance School, St. Louis, Mo., for training. As a result, the repair situation improved in 1945 when four enlisted men returned from the course and began putting their newly acquired knowledge to work.

The inception of the Green Project necessitated the following: air redeployment of combat troops from the European and Mediterranean theaters to the United States for transshipment to the Pacific during May 1945, and the attendant necessity for immediate additional supplies and equipment for Trinidad and British Guiana to meet the influx of new personnel of ATC and the Antilles Department. To cooperate with other services in conserving airlift

space for supplies required from the Zone of Interior, medical stocks in Puerto Rico were used to meet shipping requirements for the initial phase, this to the point of depleting many items of depot stock.

Subsequently, requisitions were transmitted to the New Orleans Port of Embarkation for later phases of supply for the Green Project, and supplies were sent to the medical sections of Puerto Rico and Trinidad. As a result of advance shipping from the port, and because newly arrived personnel transported with them additional expendable supplies, an overstockage resulted in both depots. To readjust this situation, a requisitioning procedure was established between both depots, obviating the necessity for requisitioning on the New Orleans Port of Embarkation and reducing overages to a balanced level.

SOUTH ATLANTIC THEATER

Early in June 1942, a Special Headquarters Staff of the South Atlantic Wing, ATC, was established at Georgetown, British Guiana. This unit was the forerunner of U.S. Army Forces, South Atlantic, which was activated on 24 November 1942 (map 1).

The principal mission of U.S. Army Forces, South Atlantic, was to establish, operate, maintain, and support all ATC activities, to cooperate with the Brazilian Armed Forces in the defense of north and northeast Brazil, and to defend Ascension Island where U.S. Force Composite 8012 had been deployed in March 1942.[18]

Between July and December 1942, medical supplies were obtained by requisitions submitted directly to the Surgeon, ATC, in Washington, D.C., filled by the Medical Supply Section at Wright Field, Dayton, Ohio, and airshipped to the station where the requisition originated. Authority had been granted to obtain supplementary supplies by requisition from the Trinidad Sector and Base Command; however, supplies available at Trinidad were limited and delays of 4 to 5 months occurred when requisitions had to be extracted by the Trinidad Supply Section to the New Orleans Port of Embarkation.[19]

Until supply personnel were assigned to the theater in late December 1942, Lt. Col. George E. Leone, MC, Theater Surgeon (fig. 41), personally prepared requisitions, and in anticipation of an expanding command, medical maintenance units were ordered. To supplement the requisitions coming through regular channels, permission was granted to purchase medical supplies locally. Although no major items of technical equipment were available in Recife, a fair quantity of drugs, chemicals, small sterilizers, and minor equipment was purchased there.

Preliminary plans were made to establish a medical supply section within the Recife General Depot, with the proposed hospitals at Natal and Belém serving as subdistribution points for supplies which would be requisitioned from the New Orleans Port of Embarkation.

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[18] Annual Report, Medical Department Activities, U.S. Army Forces in the South Atlantic, 1942.

[19] This section is based on Medical History, World War II, U.S. Army Forces, South Atlantic. [Official record.]

FIGURE 41.—Lt. Col. George E. Leone, MC, Surgeon, South Atlantic theater.

By 1 February 1943, medical depot personnel had arrived and had set up a small general depot at Belém, staffed by one officer and one enlisted man. The medical section of the general depot at Recife, was manned by two officers and two enlisted men.

The Belém depot was originally intended to function also as the supply point for medical activities at Amapá and São Luíz. However, because the actual volume of traffic with these base dispensaries was so small, it was clearly more efficient to supply them from the 193d Station Hospital at Belém. In November 1943, the medical section of the Belém depot was inactivated.

In contrast, the medical section of the Recife General Depot was assigned 200 square feet in warehouse No. 14, in the Recife dock area. With expanding activities and increasing responsibilities, the allotted space proved inadequate. The medical section moved first to an adjoining warehouse and, by early 1944, to a garage in downtown Recife. By late 1944, more space again was needed, and the section was expanded an additional 7,500 square feet, including a built-in bank vault for alcohol and narcotics. This enabled the entire medical supply section to be under one roof.

The mission of the medical section of the Recife General Depot, after November 1943 when the Belém depot closed, was to furnish medical supplies and equipment to all U.S. Army installations in Brazil. This included station

hospitals at Recife, Natal, Belém, and Ascension Island (assumed in February 1944), and base dispensaries at Amapá, São Luíz, Fortaleza, Fernando de Noronha, Bahia, and Rio de Janeiro. The Recife depot was also responsible for supplying U.S. Army transports which docked at ports of the command, and for supplying U.S. military commissions in Paraguay and Uruguay. A close liaison was maintained between the depot medical supply officer, Maj. John J. Ryder, MAC, and the officer in charge of the U.S. naval medical storehouse in Recife.

The Recife depot furnished the Brazilian Army with a limited amount of material under lend-lease according to the availability of requested items in excess stocks.

Development of penicillin resulted in a flood of requests from various sources. A policy was adopted to furnish penicillin only to military patients except in extreme emergency with the approval by the Commanding General or Chief of Staff necessary. When more penicillin became available to the civilian population in 1945, the Surgeon's Office published information regarding the purchase of penicillin from commercial sources.

Early in the war, there was no command system of accountability for supplies and equipment; however, depot supply officers kept accurate property records, and stock record accounts were kept in all stations. Formal accountability was established in October 1943. Because of the accuracy of the medical supply officers, or base surgeons who served as supply officers in some instances, the problem of initiating stock record accounts according to instructions was minimal.

Although a formal directive establishing inventory stock control procedures for all supply services was not published by theater headquarters until late 1944, these procedures had been followed before that date. The medical supply section at Recife maintained a 45-day minimum level of supplies, plus a 30-day operating level. Some difficulties were encountered in establishing a proper requisitioning objective for the depot, but by raising the objective slightly, adequate stocks were maintained despite shipping delays.

Before February 1944, routine supplies were requisitioned from the Trinidad Sector and Base Command, and nonroutine items were obtained from the New Orleans Port of Embarkation. As of 1 February 1944, Trinidad was eliminated as an intermediate supply point. Vaccines, biologicals, and emergency supplies were shipped by airfreight from Miami, while other supplies and equipment were shipped by water from New Orleans. Air shipments were received within 2 to 4 weeks after requisitioning while shipments by water were received within 110 days. In an emergency, supplies could be received in as few as 5 to 8 days.

Until mid-1944, procurement of sufficient supplies and equipment to meet the needs of a rapidly expanding command was a major problem. Until initial stocks were supplemented by medical maintenance units, reliance was placed on the local market. Biweekly rounds of the local drug companies and surgical and dental supply houses were made by a medical officer of the Recife depot.

Despite a language barrier and a lack of extensive knowledge of drugs, a considerable quantity of X-ray, dental, and laboratory equipment was purchased in Rio de Janeiro and, in March 1943, a general purchasing agency was established there.

Inexpensive spectacles of good quality were readily available in Recife and, as requirements increased, procurement time lapsed. Therefore, arrangements were made to obtain spectacles from a large optical company in Rio de Janeiro. However, because of delay in delivery and poor workmanship, arrangements were made for forwarding spectacle orders to a branch of the American Optical Co. through the medical supply officer at Camp Blanding, Fla.

The problems that occurred in the South Atlantic theater were typical of the type of climate and situation which prevailed. The heat and humidity of Brazil made equipment maintenance difficult. Instruments rusted, and X-ray film often deteriorated beyond use. Cargo received rough handling, and breakage was exceptionally high until packaging methods improved. Despite these difficulties, the medical supply situation improved rapidly because of the efforts of medical supply officers who learned to anticipate problems and to overcome them.

AFRICA-MIDDLE EAST THEATER

The long thread of air communications from Florida to India had its genesis in the route established by the Pan American Airways. Near the end of June 1941, Pan American Airways, in complying with a request from the U.S. Government, had accepted the responsibility of ferrying lend-lease planes to British forces in the Mediterranean and points further east.

In September 1941, President Franklin D. Roosevelt addressed a memorandum to Secretary of War Henry L. Stimson, indicating that arrangements were to be made at the earliest practicable time to establish and operate depots in the Middle East. These depots were for the maintenance and supply of American aircraft and ordnance material furnished to the British in that area. Such arrangements were made, and these establishments became the embryo of USAFIME (U.S. Army Forces in the Middle East). The Persian Gulf Command was born of the U.S. Military Iranian Mission, activated late in 1941 to provide aid to Russia and Great Britain.[20]

U.S. Army Forces in the Middle East

On 16 October 1941, Maj. (later Col.) Crawford F. Sams, MC (fig. 42), joined the newly created U.S. Military North African Mission as Surgeon. On 29 October, Major Sams presented plans which he had been developing before his departure from Washington; after his arrival in the theater on 22 Novem-

[20] A Narrative History of Medical Activities in the Persian Gulf Command. [Official record.] For a more detailed account of the formation of the Persian Gulf Command, see Wiltse, Charles M.: The Medical Department: Medical Service in the Mediterranean and Minor Theaters. United States Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1965, pp. 56–60.

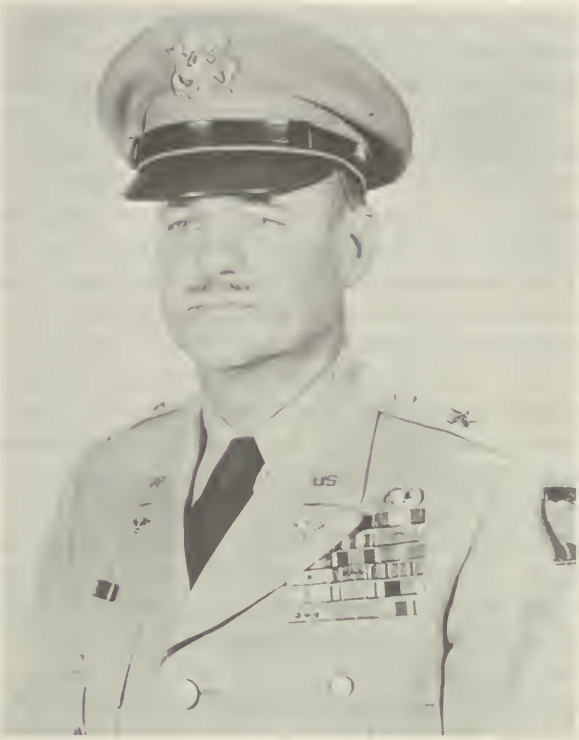

FIGURE 42.—Brig. Gen. Crawford F. Sams.

ber 1941, he modified these plans substantially, based on firsthand information.

As additional medical personnel arrived, dispensaries and a 250-bed station hospital were established. Concurrently, arrangements were made to hospitalize civilians employed by American contractors, as well as U.S. military personnel, in British military hospitals until U.S. facilities were completed.

Absence of an organized medical service in the African portion of the aircraft ferrying route presented a serious problem in Malaya and Australia. A medical plan to establish regular medical service along the ferrying routes was prepared by the mission surgeon after consultation with the Chief Medical Officer, Pan American Airways. By 19 June 1942, militarization of the North African Mission was accomplished and American military activities in that region were consolidated into a theater of operations, the U.S. Army Forces in the Middle East.[21]

This command was considered an active theater of operations, as well as a Service and Supply Command (map 1), reaching its peak strength of more than 66,000 troops in July 1943. The departure of the Ninth Air Force in August 1943 left the residual mission of supply and service. Further decline occurred in December 1943, when the Persian Gulf Command became autono-

[21] General Orders No. 1, U.S. Army Forces in the Middle East, 17 June 1942.

mous, having been on a separate requisitioning basis for some time because of its independent mission of supplying Russia.

Medical supply.—The medical supply requirements and activities were determined by such factors as hospital bed strength, patient load, and various ancillary medical facilities. On these were based the number of medical unit assemblies required, the resupply and general logistical aspects of a distant command overlapping portions of two continents. Supplies and equipment for dispensaries established in early 1942 were drawn from a 50-bed hospital assembly which had been made available to the command. Maximum hospital bed strength coincided with the peak troop strength in July 1943, with 6,250 fixed beds scattered from Liberia to Tehran.[22]

On 17 June 1942, civilian personnel arrived in the command to operate the Douglas Aircraft Corp. hospital in Gura, Eritrea. The bulk of medical items to equip this 250-bed hospital, which was to accommodate all American citizens in the area, was furnished by the Medical Department. Shortly thereafter, many hospitals, dispensaries, and other medical units began to move into the command from the United States. Because of the delay in shipping and of shortages of medical material in general, however, several items were either borrowed or obtained from the British on reverse lend-lease to expedite the opening of these U.S. medical care installations. Some local procurement was effected to advantage, also.

Upon arrival of the Advance Depot Platoon, 4th Medical Depot Company, on 1 November 1942, two advance depots were established at Darb El Hagg, Egypt, and Tel Litwinsky, Palestine, with the base depot being at Decamere, Eritrea. Due to the change in the military situation in North Africa at that time, depots in Palestine and Eritrea were consolidated with the advance depot at Darb El Hagg by February 1943. In March, this unit became the Medical Section, Heliopolis Quartermaster Depot, Camp Russell B. Huckstep, Egypt. This medical section included an optical shop for fabrication and repair of spectacles and a medical maintenance and repair shop. Maintenance shop facilities were adequate for the needs of the command as was the optical shop, which had a manufacturing capacity of 1,000 pairs of spectacles per month. During the most active portion of the buildup period, the Ninth Air Service Command operated a medical section in the Advance General Depot at Benghasi, closely supporting combat missions of the Ninth Air Force.

Until October 1943, all items of resupply were shipped automatically in the form of medical maintenance units, and requisitions were submitted to the Charleston Port of Embarkation for supplemental items and emergency requirements. From the beginning of the theater, medical maintenance units representing an estimated 6-month supply for the existing and contemplated force were set up for shipment as a means of establishing the base depot stocks. These medical maintenance units were far from complete, and back-

[22] This section is based on Essential Technical Medical Data From Overseas Forces, U.S. Army Forces in the Middle East, for January 1944, dated 1 Feb. 1944.

ordered items followed the original shipments for several months. Available 6-month supplies were initially distributed as follows: Mobile dispensaries received 10 days' supply; Air Force service squadrons, 30 days' supply; and hospitals, 90 days' supply.

U.S. Army Forces in the Middle East, while favoring the use of medical maintenance units during the buildup period, made these several recommendations to the Surgeon General's Office in view of the overages and shortages ascribed to their use: (1) the simultaneous arrival of the first troops with their initial maintenance, subsequent troop shipments to be preceded by their initial maintenance; (2) the nonestablishment of back orders for items short in the medical maintenance units shipped overseas; and (3) shipment of medical maintenance units at regular intervals, with the theater supply officer constantly checking and advising the port medical supply officer of all inadequacies and overages.

Simultaneous shipments were tried in every instance. Initial maintenance preceding the arrival of troops was accomplished occasionally when troop movements could be anticipated with any degree of certainty and supplies could be made available in advance of a movement.

By early 1943, back orders were discontinued on initial maintenance shipped with the units. Monthly shipments of medical maintenance units were considered as basic stocks for the theater and an interim substitute for theater requisitioning. These items, although many were constantly shifting from availability to nonavailability and back again, constituted a cross section of the essential items of supply.

Thus, failure to backorder items for the maintenance units could deprive the theater of many essential items for protracted periods without detection or correction. This was particularly true in the Middle East where the first 6 months' supply of units was shipped as rapidly as shipping space permitted. The theater policy was recognized as having some merit, especially when accumulated back orders arrived 6 months after the original shipment and accompanied the succeeding periods' shipments of maintenance units which included authorized quantities of the items by reason of their sudden availability. This virtually transposed the status of some items from a shortage to an excess position.

There was never discord within the medical supply system on this matter. The paucity of shipping space during the early days and the relatively low priority of nonemergency medical supplies permitted accumulation of medical maintenance units on U.S. docks for prolonged periods, provoking hardships despite the protests of the Surgeon General's Office.

Levels of supply.—Because of distances involved between supply points and the limited means of transporting bulk stocks, it was highly desirable that stations carry at least 90 days' stock. This was attempted at the outset, but theater stocks would not permit such an extravagant distribution, and stations necessarily reverted to a 30-day level, with monthly requisitions. As command stocks became more abundant in mid-1943, all stations were authorized to in-

crease levels to 120 days (not to exceed 6 months), and to requisition quarterly. Dispensing with the medical maintenance unit as the primary means of supply, quarterly command requisitions were instituted on the port, based on 210 days of supply including 110 days' shipping time. Commencing with the March 1944 requisition, the War Department directed that command levels would be reduced to 45 days' minimum plus 30 days' operating, or a total of 75 days' maximum level plus shipping time. Stations again reverted to a 30-day level and monthly requisitions. This War Department action provided the Zone of Interior with a better means of meeting accelerated demands in the scattered combat areas.

With unit personnel frequently arriving months ahead of their unit assembly, and with unit assemblies invariably split in transit, all assemblies were shipped to the depot for reprocessing before issue to units. At the outset, unit assemblies had to be improvised by using the limited U.S. stocks available, augmented with British equipment and the limited, but more expensive, locally procured items. The command found that this processing of unit assemblies through the depot had a dual benefit. Initial requirements were met with limited stocks, and a reserve stock was accumulated for reprocessing and reconstructing assemblies, which would conform to actual needs with a saving in material. Despite these benefits, shortages persisted and unit improvisation was necessary.

Persian Gulf Command

Having originated with the Military Iranian Mission in October 1941, and become the Persian Gulf Service Command in August 1942, the Persian Gulf Command was designated a separate theater on 10 December 1943 (map 1).

The first American hospital in the Persian Gulf Areas was the 2d Station Hospital, which began operations on 6 June 1942. This hospital acquired its initial supplies and equipment from various sources.

The Advance Depot Platoon, 7th Medical Supply Depot, arrived at Khorramshahr, Iran, on 25 January 1943 and, 2 weeks later, opened a depot at Ahwaz.[23] While the platoon was at Ahwaz, a fire broke out on 21 June 1943, destroying medical supplies valued at $350,000. However, large quantities of medical supplies had just arrived from the United States and these were in Khorramshahr at the time of the fire. The losses at Ahwaz were thus minimized and fortunately did not hinder the flow of supplies to various units and hospitals.[24]

By September 1943, the depot was preparing to be moved to Khorramshahr, where a subdepot was established as part of the general depot (fig. 43). The move was made in November 1943, after which the unit was redesignated the 22d Medical Depot Company. A 6-month supply of initial maintenance,

[23] (1) Report, Section I, Advance Depot Platoon, 21st Medical Supply Depot, to Commanding General, Persian Gulf Service Command, 30 June 1943, subject: Initial Historical Report. (2) Annual Report, Section I, Advance Depot Platoon, 22d Medical Depot Company, 1943.

[24] Annual Report, Persian Gulf Command, 1943.

FIGURE 43.—Loose issue room, Medical Supply Section, General Depot, Khorramshahr, Iran, December 1944.

comprised of medical maintenance units, was shipped to the Persian Gulf Command. Units retained 3 months' stock and the depot took custody of the other half. As in USAFIME shipments, these medical maintenance units were far from 100 percent complete on the initial shipments and back-ordered shortages followed for several weeks. Additional shortages resulted from poor packaging and rough handling in transit.[25]

Paralleling the USAFIME experiences, hospital unit assemblies shipped to the Persian Gulf Command were frequently fragmented. In one instance, a field hospital unit which had arrived in December 1942 received the bulk of its unit assembly in periodic shipments and not until 1 May 1943 had sufficient portions been received to set up operations. These imperfections were occasioned by shortages of stocks in the United States and by failure to load all available components of the unit assembly on one vessel. As a result, hospital personnel were either immobilized or placed with British or U.S. functioning hospitals. A hospital was often temporarily improvised by drawing on local

[25] (1) Essential Technical Medical Data, Persian Gulf Command, for August 1943, dated 11 Sept. 1943. (2) Essential Technical Medical Data, Persian Gulf Command, for September 1943, dated 15 Oct. 1943.

civilian facilities or U.S. and British sources. Materials obtained from the British in the area, under reverse lend-lease, from 1 January 1943 through April 1945 were valued at more than $23,000. A significant portion of these materials were dental supplies and equipment, which were extremely short in the U.S. Army medical supply system.[26]

During the period of scarcity of equipment and facilities, the ingenuity of the unit personnel was equal to the situation.

To combat spoilage among vaccines and serums, a satisfactory Dry Ice was manufactured from cylinders of carbon dioxide. Approximately 17 pounds of ice could be produced in 30 minutes from the contents of one 15-gallon cylinder of the gas.

Medical treatment facilities were equally adaptable. As interim measures, operating lamps were made from large metal kitchen mixing bowls; a bicycle pump served to maintain pressure in a steam autoclave; and a French fryer mounted over a plumber's blowtorch made an excellent instrument sterilizer. This becomes more significant when it is realized that the Persian Gulf Command improvisations were without the benefits of a medical maintenance shop. In time, improvised material was largely displaced with standard equipment.

A survey was conducted early in 1943 to determine high mortality of repair parts, and requisitions based on the results of that survey were submitted to the Charleston port. Although at that time hospitals were without assigned repair technicians, many units had personnel who could make repairs. In the Persian Gulf Command, the local engineer and ordnance shops were used freely by personnel in repairing and fabricating medical equipment. Repairable equipment beyond the capability of the Persian Gulf Command was returned to the United States as replacements were requisitioned.[27]

The shortage of medical supply catalogs in the Persian Gulf Command was alleviated in April 1943 when an overseas medical supply catalog, which provided guidance for requisitioning supplies, was compiled in the Zone of Interior and was made available to all units. The manual included lists of items that comprised the medical maintenance units, final reserve units, and similar lists with identifying catalog numbers, nomenclature, and unit of issue. These were duplicated and distributed to all units in the Persian Gulf Command.

In January 1944, the level of supply for the command was reduced from 210 days to 105 days. Automatic requisitioning was discontinued at this time and thereafter medical supplies and equipment were requisitioned on the basis of table-of-organization-and-equipment authorization and consumption. The reduction of the days' level of supply created overages in certain items, which were augmented by the abolishment of our final medical reserve. Excesses beyond a 6-month supply were declared and properly disposed of.[28]

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[26] See footnote 20, p. 194.

[27] (1) Annual Report, Persian Gulf Command, 1944. (2) Essential Technical Medical Data, Persian Gulf Command, for January 1944, dated 13 Feb. 1944.

[28] See footnote 27(1), above.

FIGURE 44.—Medical supply issue room, Third Platoon, 26th Field Hospital, Khorramabad Iran, November 1944.

The only interruption to the continuous flow of medical supplies to the theater occurred in April 1944, when two vessels loaded with medical equipment were damaged during enemy action. Repairable equipment damaged beyond the capabilities of the repair facilities at hand was returned to the Zone of Interior while unrepairable equipment was disposed of by report of survey.

During April and May 1944, Eastern Command, a tactical command for which the Persian Gulf Command had supply responsibility, was established in Russia. A considerable quantity of supplies and equipment was supplied from Persian Gulf Command stocks. Requisitions for items which could not be furnished were extracted to the Zone of Interior and the equipment was forwarded on receipt in the Persian Gulf Command. When the Eastern Command (fig. 44) was reduced some months later, the equipment was absorbed back into the command stock or declared excess.

An optical repair unit was attached to the Khorramshahr General Depot in June 1944. Before that time, all spectacle prescriptions had been forwarded to USAFIME for processing.

As medical units were transferred from the command in 1944 and 1945, excess items were recovered by the depot and reissued from time to time.

Other Commands

While the Persian Gulf Command was a key supply link to Russia and the Far East, the U.S. Army Forces in Central Africa with headquarters at Accra, Gold Coast, had the primary mission of the construction, operation, and defense of Ferry Command and Air Transport Command installations in Central Africa. Established on 16 June 1942, this command was merged with the U.S. Army Forces in the Middle East on 15 September 1943 and redesignated the West African Service Command (map 1).

The medical supply depot for the entire area was established originally at Accra, but when the command changed, it was placed under the control of the 67th Station Hospital. The second depot, established at Dakar was placed under the control of the 93d Station Hospital.

As in the Caribbean and Persian Gulf Areas, heat and moisture caused many problems. Many surgical instruments, unless coated with grease or stored in dry closets, rusted. Most surgical knife blades and needles packed in glassine paper and cellophane were rusty when opened. No rust was noted on those packed in wax paper.

Emergency lights shorted out within 2 weeks and batteries also deteriorated rapidly. Deterioration also occurred with hydrogen peroxide and X-ray film. Provision for the repair and replacement of parts was limited. To assure the availability of mechanical parts of motors, X-ray tubes, batteries, and oxygen, requisitions were placed well in advance of actual needs.[29]

Throughout 1944, the medical supply functions of the 93d Station Hospital were normal and receipt of supplies and equipment was satisfactory. Effective on 1 March, supplies were requisitioned monthly on the basis of a 45-day minimum level plus 30-day operating level, or a total of 75 days' maximum level. This, plus the 110-day order and shipping time, constituted the requisitioning objective of 185 days.

The Medical Supply Depot, 67th Station Hospital, also functioned as a base medical supply depot for the West African Service Command, U. S. Army Forces in Liberia, and ATC stations in Nigeria, Gold Coast, and Senegal. A stock record system, maintained since January 1943, was revised in March 1944. Stock levels based on actual consumption were established and the monthly submission of requisitions was put into effect.

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[29] Essential Technical Medical Data, West African Service Command, U.S. Army Forces in the Middle East, for August 1943, dated 11 Oct. 1943.

CHAPTER VIII

Mediterranean Operations

PLANNING FOR THE INVASION OF NORTH AFRICA

After preliminary discussions held in the Arcadia Conference of December 1941 to January 1942, the Allied leaders decided to begin formulating definitive plans by late July for Operation TORCH, designed to gain complete control of northern Africa. These plans, which were completed in August and September 1942, provided that task forces of the United Kingdom and the United States should strike simultaneously at Algiers and Oran on the Mediterranean coast and at Casablanca on the Atlantic coast of Morocco, in coordination with a planned offensive of the British Eighth Army from the El Alamein line in the East.[1]

Western Task Force

Despite the fact that medical supplies were limited, supply planning was adequate. The medical troops were to land with unit equipment and combat supplies, minus special items which would follow in later convoys. A 30-day maintenance of supplies, including blood plasma, special drugs, and biologicals, was to be unloaded on the beaches, and a 60-day maintenance was to be unloaded at the main port of entry. A 45-day supply level was to be maintained, and medical supply points were to be established on the beaches for each combat group after the landing of assault troops. Also, a medical supply depot was to be established at the main port of entry as soon as possible after D+5 to provide support for the entire task force.

To minimize disturbing the wounded and to maintain an even distribution of equipment, arrangements were to be made for the exchange of litters, blankets, splints, and similar items at transfer points.

The Western Task Force of 34,000 American troops was to land along the western coast of Morocco after sailing from the United States. In the assault on Safi, a company of the 9th Medical Battalion was to handle the medical supplies for Subtask Force Blackstone, a medical supply depot was to be established which would be responsible for obtaining supplies and hav-

[1] For a more definitive discussion of strategic planning for Operation TORCH, see Howe, George F.: Northwest Africa: Seizing the Initiative in the West. United States Army in World War II. The Mediterranean Theater of Operations. Washington: U.S. Government Printing Office, 1957, pp. 13–31.

ing them available for use by the collecting station, and property exchange with the battalion medical section and the naval shore party was to be controlled. The unit was also responsible for furnishing medical supplies for the battalion medical sections.

Medical support for Subtask Force Goalpost, which was to land in the Mehdia-Port Lyautey area, and for Subtask Force Brushwood, which was to land at Fédala and swing south to capture Casablanca, was to be furnished by detachments from the medical battalions organic to the divisions involved, augmented by a detachment from the 56th Medical Battalion.[2]

Center Task Force

The Center Task Force of 40,800 American and British troops of the II Corps was to land in the vicinity of Oran, Algeria. Its supply planning was conducted on a joint British-American level from 3 September to 20 October 1942.

Because of a shortage of medical supplies in the United States and limited shipping space, needed material had not been arriving in England. The British, therefore, were to furnish medical material whenever possible. To further satisfy supply shortages, assemblies not needed elsewhere were applied to the task force requirements. Additional supplies were sent to the United Kingdom from New York for initial depot stocks and to fill out hospital equipment assemblies turned over to the U.S. forces by the British.

Processing of requisitions for initial issue, and for replacement of medical supplies for the task force while it was in the United Kingdom, was accomplished by the 1st Medical Supply Depot. This depot, while operating 5 separate depots, accomplished the overwhelming task of equipping combat troops with 15 days of medical supplies, packing and shipping 27 medical maintenance units, reprocessing 3 surgical hospitals, 3 evacuation hospitals, 5 station hospitals, and 2 general hospitals.[3]

Eastern Task Force

The Eastern Task Force of 23,000 British troops and 10,000 Americans was to land in the vicinity of Algiers. For political reasons, the American elements, two regimental combat teams, were to withdraw and let the British have full control after the initial assault. Responsibility for logistical support

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[2] (1) Headquarters, Task Force A, Washington, D.C., Annex No. 2 to Administrative Order No. 1, 10 Oct. 1942. (2) Annual Report, 9th Medical Battalion, 9th Infantry Division, 1942. (3) Journal, 56th Medical Battalion, 7 December 1941–1 May 1942 and 26 November 1942–17 January 1943. (4) Wiltse, Charles M.: The Medical Department: Medical Service in the Mediterranean and Minor Theaters. United States Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1965.

[3] (1) Annual Report of the Surgeon, II Corps, 1942. (2) Letter, Col. F. C. Tyng, MC, Chief, Finance and Supply Service, OTSG, to Lt. Col. Earle G. G. Standlee, MC [Chief, Finance and Supply Division], Office of the Chief Surgeon, ETOUSA, 1 Aug. 1942. (3) Annual Report, 1st Medical Supply Depot, ETOUSA, 1942.

fell primarily on the British First Army, which was to be supplied from the United Kingdom.[4]

ASSAULT ON NORTH AFRICA

Western Task Force

The leading elements of the Western Task Force landed at three points—Safi, Fédala, and Port Lyautey—on the western coast of Morocco during the early morning hours of 8 November 1942.

To protect the 30-day stock of medical supplies, they were evenly distributed in the convoy. The inadequate number of available vehicles was accentuated by the commandeering of some of them for other combat duties. Only 8 cross-country, and 12 armored, ambulances were available for medical support necessary between the beaches.[5]

The bulk of the supplies for Subtask Force Blackstone was unloaded at the Safi docks where a large warehouse was converted into a regimental aid and collecting station. However, because of the great confusion which was caused by sniper fire, landing of equipment was hindered considerably. The novel idea of stenciling exchangeable equipment did not work out in practice. Equipment which went back to the ships with casualties was seldom returned. A serious shortage of blankets was averted, however, because the 56th Medical Battalion had carried an extra supply.

As there was no equipment available other than that brought in by company B, cots and other needed equipment were borrowed from the Navy. An operating table was obtained, X-rays and sterilization were handled by the French hospital, and a much needed refrigerator was obtained from a local merchant.

Approximately 40 surgical operations were performed at night with three flashlights providing the illumination.[6]

Despite delays caused by heavy enemy fire, supply dumps were established on the main beaches near Fédala by the afternoon of D-day. Forward movement of these supplies was held to a minimum because of the serious lack of transportation. Shortages of essential medical supplies and equipment resulted because ships were behind schedule in unloading.

Encountering perhaps the stiffest resistance, Subtask Force Goalpost was forced to advance its H-hour, and only a few waves were landed by daylight.

Contrary to the expected practice, morphine tablets were issued and used. Syrettes, requisitioned by the medical depot of the command before embar-

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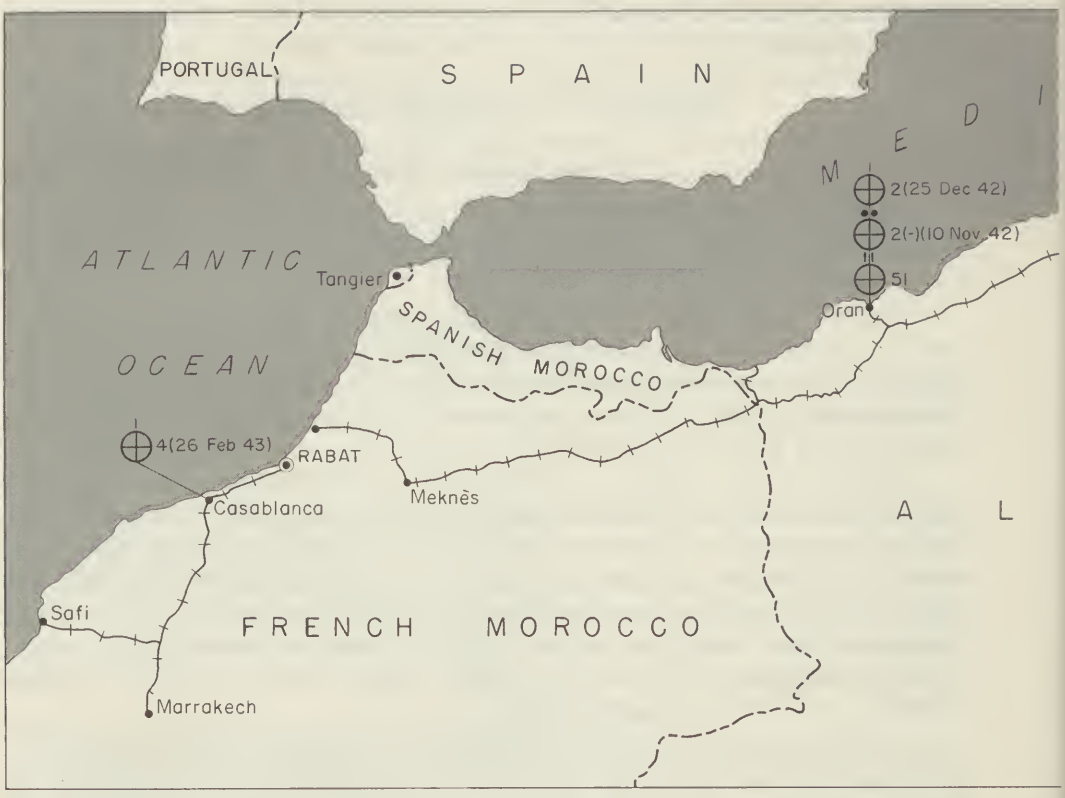
[4] (1) Davidson, William L.: Medical Supply in the Mediterranean Theater of Operations, U.S. Army. [Official record.] (2) Letter, Col. C. R. Landon, AGD, Headquarters, SOS, ETOUSA, to Commander in Chief, Allied Forces, and others, 18 Jan. 1943, subject: Supply of TORCH from U.K.

[5] Kenner, Albert W.: Medical Service in the North African Campaign. Bull. U.S. Army M. Dept. 76: 76–84, May 1944.

[6] (1) Clift, Glenn G.: Field Operations of the Medical Department in the Mediterranean Theater of Operations, United States Army. [Official record.] (2) See footnote 2(2), p. 204.



MAP 4.—Medical supply depots

kation, were mistakenly held for base hospitals which did not arrive until later convoys.[7]

Center Task Force

Favored by the element of surprise, the initial assault on three beaches in the Oran area was successful. Arzew was secured at 0300 hours and the 48th Surgical [later redesignated 128th Evacuation] Hospital came ashore and began operating. Much of the necessary medical equipment was not available until 1800 hours, but a makeshift hospital nevertheless was set up in a French barracks. Emergency supplies and supplies obtained from transports were used until the morning of D+2, when the equipment of the 38th Evacuation Hospital arrived and was turned over to the 48th Surgical Hospital. Among these supplies were 480 units of plasma and 100 morphine Syrettes.

[7] (1) Final Report of Western Task Force, Operation TORCH, 7–11 Nov. 1942, Annex No. 2, Headquarters, Subtask Force Brushwood, 3d Infantry Division (Reinf.), Fédala, Morocco, Casablanca Operation. (2) Letter, Brig. Gen. L. K. Truscott, Jr., to Commanding General, Western Task Force, 18 Dec. 1942, subject: Report of Operations [Goalpost], in Final Report of Western Task Force, Operation TORCH, 7–11 Nov. 1942, Annex 3. (3) Camardella, Ralph A.: Medical Aspects of Landing Operations, Subtask Force Goalpost, 8–11 Nov. 1942. [Official record.]

in North Africa, 1942–43.

By December 1942, the 38th Evacuation Hospital had the bulk of its equipment and was operating under tentage near Oran.

The 51st Medical Battalion, which arrived on the D+3 convoy, was responsible for setting up a medical supply depot after a detachment had distributed medical supplies to the beachhead troops. Some difficulty occurred in coordinating activities between the port regulating officer and the medical supply officer of the task force. The first medical supplies received at the port rarely reached the dump, or arrived in bad condition. Boxes were not properly tagged and packing lists were practically nonexistent.

After the fall of Oran on 10 November, the 1st Advance Section of the 2d Medical Supply Depot landed and relieved the 51st Medical Battalion of the supply dump operation. Unfortunately, many desperately needed vehicles were lost at sea. On Christmas Day 1942, the balance of the 2d Medical Supply Depot, commanded by Lt. Col. Elmer B. M. Casey, MC, arrived in Oran, where it joined its advance section in the operation of the depot (map 4).

Because of the critical shortage of drugs, surgical instruments, dental supplies and equipment, and some basic hospital and medical field items of equipment, subsequent issues were made on a priority basis according to the role

that a given organization was playing in the operation. As troops moved forward, it was necessary to build medical maintenance for their support. This caused a tightening of issues to local troops and caused an avalanche of complaints. This situation, however, was remedied rapidly, and by 21 November, practically all required items could be provided.

Perhaps the most serious problem of medical supply during the early stages of the Center Task Force was the lack of proper communication between principal medical supply personnel, probably because of the extreme secrecy of the operation.[8]

Eastern Task Force

The Eastern Task Force landed on the beaches near Algiers on schedule and was initially unopposed, but firm resistance was encountered as the troops began to move inland.

Medical support rendered during the operation came from company C and the 2d Platoon of company D, 109th Medical Battalion, and company A and the 2d Platoon of company D, 9th Medical Battalion, organic respectively to the 34th and 9th Divisions; and from four teams of the 2d Auxiliary Surgical Group. The first detachment of company C, 109th Medical Battalion, landed at 0730 hours on D-day (8 November), carrying its medical supplies and equipment on six heavily laden litters. A clearing station with one ambulance, six litters, and other medical supplies was established. Because of the delay in unloading the medical supplies and equipment, U.S. medical units had to obtain emergency supplies from the British, who hand-carried them from the beach. In several cases, rough seas prevented the rapid unloading of material.

It was not until D+6 that, by using borrowed vehicles, all supplies from the ship were unloaded and transported to a schoolhouse where the hospital was sited.

Lessons Learned From Operation TORCH

One of the paramount medical problems of the entire TORCH operation was that personnel did not have in their possession sufficient medical equipment to permit their proper functioning upon landing. To provide an initial supply dump, it was suggested that each medical soldier be issued a haversack or carrier containing vitally essential dressings, instruments, drugs, and blood.

It was also suggested that medical maintenance units be packed in 100-pound waterproof boxes, designed for hand-carrying during landings.

In addition, it was proven that the 4- by 4-ft. ambulance was inadequately

[8] (1) Annual Report, 128th Evacuation Hospital, 1943. (2) Annual Report, 38th Evacuation Hospital, 1942. (3) Annual Reports, 2d Medical Supply Depot, 1942 and 1943. (4) See footnotes 4(1), p. 205; and 6(1), p. 205.

powered and had too high a silhouette. A half-track or six-wheeled vehicle was suggested as a substitute.[9]

ESTABLISHMENT OF BASE SECTION MEDICAL SUPPLY

With the formation of Headquarters, Mediterranean Base Section, on 7 December, followed closely by the opening of Headquarters, Atlantic Base Section, on 30 December 1942, there began what might be considered the outstanding logistical agency in the war against the Axis. Activation and employment of the base section in the wake of the conquering Army became standing operating procedure.

Atlantic Base Section

The Surgeon's Office, Atlantic Base Section,[10] with Col. (later Maj. Gen.) Guy B. Denit, MC, as Surgeon, was originally established in September 1942 as the Surgeon's Office, Headquarters, SOS (Services of Supply), Task Force A, located at Fort George G. Meade, Md. The medical supply section of this office was under the command of Maj. (later Lt. Col.) Theodore L. Finley, MC, the Medical Supply Officer, who coordinated the preparation and shipment of 6 tons of medical supplies by 13 December.

Upon arriving in Casablanca on 24 December 1942, the medical supply officer of Western Task Force, Maj. (later Lt. Col.) Marcel H. Mial, SnC, discovered that some medical supplies were already stored in warehouses situated in five widely separated locations. Need for additional storage space was evident, and sufficient additional space was gradually acquired.

During the early days in North Africa, all medical supply activities were under the control of Western Task Force; however, in the meantime, an agreement was reached whereby the supply officer of Headquarters, SOS, working closely with the task force medical supply officer, would familiarize himself with the supply operation. As only one officer among the supply personnel was experienced, this handicapped operations to some extent.

Despite numerous difficulties involved in obtaining, transporting, and properly storing medical supplies and maintaining a stable work force, subdepot issue points were established at Casablanca and Rabat by December 1942. Personnel of hospital ship platoons began the first physical inventory of medical supplies at these points. Under the direction of Colonel Finley and Lt. Col. (later Col.) Karl H. Metz, DC, the assistant supply officer, necessary requisitioning was initiated. Colonel Metz undertook the establishment of

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[9] (1) Platt, Edward V.: Record of Events, Company C, 109th Medical Battalion, October 15, 1942 to November 9, 1942. [Official record.] There are similar reports by Capt. Thomas E. Corcoran, MC, commanding officer of company C, and by Capt. Francis Gallo, MC. (2) Weiss, William A.: Record of Events [2d Auxiliary Surgical Group, Headquarters, Special Troops (Prov.), EAF], October 19, 1942 to November 20, 1942, 9 Dec. 1942. [Official record.] (3) Memorandum, Col. John F. Corby, MC, Deputy Surgeon, AFHQ, to Chief of Staff, AFHQ, 30 Jan. 1943.

[10] This part of the chapter, unless otherwise stated, is based on the Annual Report of the Atlantic Base Section, 1943.

necessary depot routine and organization of records. During this time, one issue point and four warehouses were opened.

On 26 February 1943, Maj. Frederick Schneider, MAC, arrived and was designated assistant supply officer. At this time, the 4th Medical Supply Depot [later 4th Medical Depot Company],[11] commanded by Maj. (later Lt. Col.) Walter Smit, VC, arrived to assume the operation of the Atlantic Base Section Medical Depot. Supply points were immediately opened at Rabat and Meknès, and a final reserve warehouse was set up at Safi.

Before the acquisition of several warehouses in Casablanca, it became necessary to store valuable supplies out of doors in a bivouac area. In Casablanca alone, there were 14 small warehouses; consolidation was impossible because of the nonavailability of larger buildings and the competition for space which came from hospitals and the other technical services.

Emphasis abruptly shifted to the assembling of medical maintenance units needed in other areas of North Africa in support of combat troops. An effort was made to balance requirements in the entire theater. In April, a 25-bed station hospital was shipped to Marrakech (map 4), and two medical maintenance units were sent to Rabat for storage to facilitate forward movement of balanced medical stocks. Much equipment was moved by train to the Mediterranean and Eastern Base Sections at the request of the medical supply officer of the North African theater.

Despite many handicaps, more than 700 requisitions a month were filled by the Atlantic Base Section medical supply depot during the first months of operation, including a pressing demand for smallpox vaccine.

By June 1943, the level of supply had reached 141 days, and the problem of adequate warehouse space recurred. In July, the space problem was eased somewhat when 100 tons of medical supplies were turned over to the French, and additional warehouse space was obtained. The shipment of 400 tons of additional supplies to the Eastern Base Section to use in support of combat troops also helped considerably.

Mediterranean Base Section

Beginning with the cessation of hostilities in the Oran area on 10 November 1942, space, which was acquired where it could be found, was sufficient only to satisfy immediate needs. The principal storage and issue site consisted of 22,000 square feet, located in the outskirts of Oran proper. The buildings where all medical supplies were first delivered were new, two-story, permanent type. Here, both issue and warehousing functions took place. Practically all stocks during this early period were medical maintenance unit items shipped with the initial convoys.

A former wine storage warehouse of some 22,000 square feet was acquired subsequently in Oran proper, and all incoming supplies were first processed through this point, broken down into general groups, and stored

[11] History, 4th Medical Depot Company (formerly 4th Medical Supply Depot), 1940–45.

or redistributed to other locations. No absolute checking or "tally-in" was effected.

Another building, 2,250 square feet, was used exclusively for storing three medical maintenance units which were regarded as the final reserve units. Other lesser storage locations were acquired in the greater Oran area (fig. 45 A, B, and C) to accommodate the overflow of supplies received.[12]

The first depot of the Center Task Force, operated by the 51st Medical Battalion, had a depot and issue section under one officer, and a receiving and warehouse section under a second officer; the third officer, along with the port medical supply officer, undertook the considerable task of locating medical supplies and directing them to the receiving warehouse in Oran. During this period, identification and location of medical supplies at the port unloading points were made extremely difficult by the lack of personnel and by inaccurate ship manifests. Because information on berth locations of unloading ships was withheld as a security measure, a prolonged search for the supplies forestalled preplanning for the movement of supplies to the warehouses.

Competition with the French Army for storage space was more keenly felt in the Oran area than in the Casablanca area. The French Army had priority and, as a result, the U.S. Army medical supply requirements were placed low on the list. For these reasons, numerous small medical warehouse locations were scattered over a wide area.

Because of lack of proper warehousing and inequitable distribution of supplies, complete records of depot stock could not be maintained. All hands worked around the clock to accomplish an inventory, but it was not until after 8 December 1942, when the Mediterranean Base Section assumed control from Center Task Force, that physical inventory was ordered and accomplished, and a semimonthly stock status reporting system was established.

The medical supply personnel of the Mediterranean Base Section were inexperienced and were only hastily briefed on the supply situation. Their immediate problem was the location and consolidation of scattered medical supplies. Indigenous labor was employed to unload and load the scarce vehicles. Numerous incidents of loss of supplies resulted from exposure, pilferage, or accident in the port area, owing to lack of immediate transportation.

In the beginning, medical supplies were received automatically from the United States and the United Kingdom in the form of medical maintenance units (fig. 46), supplemented by items required for the geographical location and the type of operation involved. Automatic shipments from the United States ceased soon after the invasion.

During the first few months of the North African campaign, the need for balancing medical stocks with adequate stock control measures, for requirements determination by item, and for separate requisitioning on the Zone of Interior was apparent. Automatic supply served its purpose well during the initial stages, but even the first requisitions submitted by Mediterranean Base

[12] This section is based on the Annual Report, Mediterranean Base Section, 1943.

FIGURE 45.—A. Exterior view of a medical supply warehouse in Oran. B. Oran depot optical shop.

FIGURE 45.—Continued. C. Issue section of the Oran Medical Depot.

Section on about D+30 had to be prepared on a man-days of supply basis by item, rather than by a calculation based on actual item demand experience.[13]

In North Africa, where indigenous personnel provided most of the stevedore service (fig. 47), color markings appropriate to each technical service were placed on the corners of the boxes. This proved to be a great boon to the unloading and sorting process as natives, who were unable to comprehend the instructions on shipping documents or stenciled on the sides of the boxes, sorted the supplies on the docks and beaches by color, thus enabling faster and less confusing removal of supplies to warehouses.[14]

By February 1943, the problem of medical warehouse space in Oran became so severe that an unprecedented appeal was made to G–4 of that headquarters by the Surgeon. A tour of all depots impressed G–4 so much that a crash construction program was begun, and an excellent shed-type depot was established on the outskirts of the city.[15]

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[13] Medical Supply History, Mediterranean Base Section, 27 Sept. 1943. [Official record.]

[14] Letter, The Adjutant General, Headquarters, ETOUSA, to Commanding General, SOS, ETOUSA, and others, dated 9 Sept. 1942, subject: Information and Markings Required for Overseas Shipment.

[15] See footnote 13, above.

FIGURE 46.—Medical maintenance unit, the primary means of automatic supply from the Zone of Interior, underwent its first projected test of combat support in the North African campaign.

TUNISIA CAMPAIGN

Supply Buildup

From the beginning of the Tunisia Campaign, launched when the Eastern Task Force turned east from Algiers on 11 November 1942, it was obvious that supporting medical units had to be highly mobile. The fluid front, the lack of a secondary road network, and the poor condition of the main road from Algiers were sizable obstacles. Inadequate single track, narrow gage railways were the main links from the Mediterranean Base Section to the Tunisian front.

As fighting developed into a seesaw battle in Tunisia, American medical units and their supplies were building up in the Mediterranean Base Section in preparation for their concentration in the Tébessa-Kasserine area. They were to join in support of the II Corps, which was preparing to drive to the eastern coast of Tunisia to prevent the uniting of the *Afrika Korps* and the

FIGURE 47.—Indigenous personnel unloading supplies at Casablanca. After color markings were introduced which identified the material for each technical service, natives were able to sort as well as unload despite the fact that they were unable to read English.

German forces in Tunisia. The 1st Advanced Section of the 2d Medical Supply Depot was detached to furnish medical supply support for this operation.[16]

Resupply of the advancing units was effected automatically by shipment of 18 medical maintenance units from Oran and the United States. This was later augmented by a balanced stock of supplies, shipped directly from the United States on requisition initiated by the Surgeon's Office, NATOUSA (North African Theater of Operations, U.S. Army).

In coordination with the II Corps offensive of 26 January, medical units were concentrated in the Constantine-Tébessa area and, 10 miles south of Tébessa, the 1st Advanced Section of the 2d Medical Supply Depot went into operation. As part of the buildup, a heavy forward movement of medical supplies and equipment took place from Oran by way of the single rail line

[16] See footnote 8(3), p. 208.

through Algiers to Constantine and the narrow gage link from there to Tébessa. An initial stockage of four medical maintenance units, consisting of 70 tons of medical supplies, was set up and subsequent resupply for the corps was carried out with medical maintenance units and special requisitions. Because of the various problems of transportation and communication, timely coordination and shipment of required supplies and equipment were extremely difficult. Activation of the Eastern Base Section and establishment of their medical depot at Constantine (map 4) greatly improved this situation.[17]

Eastern Base Section

On 22 February 1943, during the most critical point in the Tunisian struggle, Headquarters, Eastern Base Section (map 4) was activated. Consistent with the pattern of base section employment, personnel were drawn from the previously established Atlantic and Mediterranean Base Sections. The first medical depot in the new base section was established at Ain M'Lila and went into operation with 40 tons of U.S. supplies and supplies from the British depot near Bône. By May, the original 40 tons had been increased to 383 tons. To accommodate this rapid supply buildup, medical sections were opened in two general depots at Bône and Philippeville. However, the main concentration of supplies remained at the Ain M'Lila depot, which, along with the two medical sections, was operated by the 4th Medical Supply Depot. Relief from this heavy burden was forthcoming with the assignment of a section of the 2d Medical Supply Depot to Ain M'Lila on 3 April 1943, and the arrival of the 7th Medical Supply Depot at Mateur, where they established a medical section in General Depot No. 6 on 26 May 1943.

The 7th Medical Supply Depot, commanded by Maj. (later Col.) Clark B. Williams, MC, had practically no warehouse space allotted to it and, therefore, obtained additional warehouse space by repairing several buildings. In spite of this, incoming supplies were received in quantities too great to place under cover and, in August and September, about 1,000 tons of supplies were in open storage. Fortunately, before the rainy season, a large warehouse in Bizerte was assigned to the medical depot and the situation was relieved somewhat. Proper warehousing was still difficult because of the scattering of supplies through some 26 warehouses of varied size. By 15 October, all medical supplies were consolidated into the 7th Medical Supply Depot [later 7th Medical Depot Company] at Mateur.[18]

Because of certain surpluses reported by Maj. (later Lt. Col.) Henry T. Lapp, MC, the Mediterranean Base Section medical supply officer, a revision of the medical maintenance unit (fig. 48) was proposed. In a conference held in Oran, which included representatives from all echelons of supply, a combat medical maintenance unit—a modification of the current unit—was created.

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[17] See footnote 12, p. 211.

[18] (1) General Order No. 5, NATOUSA, 13 Feb. 1943. (2) Annual Report, Eastern Base Section, 1943. (3) Annual Report, 7th Medical Supply Depot [later 7th Medical Depot Company], 1943.

FIGURE 48.—While the standard medical maintenance unit served as a means of support to a theater, with emphasis on desert and tank warfare casualties, it was found that specific combat operations could be more proficiently served by a modified cut-down version.

Items and quantities included were tailored to the Tunisian combat requirements. Unessentials were eliminated or reduced while items in greater demand were added or existing quantities increased. The result was a compact 30-day supply for 10,000 troops, with a weight of 12 to 14 tons compared to the standard weight of 20 tons. This proved to be highly satisfactory, and information was cabled to the Surgeon General's Office for appropriate action. Subsequent modifications were made by NATOUSA as experience dictated. From this experience, the beach medical maintenance unit was designed for use in the Sicilian operation.[19]

Drive Through Tunisia

Preparations began for an anticipated offensive after the withdrawal of the German forces at Kasserine Pass on 22 February.

Medical units were hard-pressed during the subsequent action, which began on rugged terrain which somewhat handicapped movement of supplies.

[19] (1) See footnote 12, p. 211. (2) Report, Maj. Gen. A. W. Kenner, Chief Medical Officer, SHAEF, to Chief Surgeon, ETOUSA, and others, 13 Apr. 1944, subject: Report of Visit to AFHQ.

FIGURE 49.—Col. Charles F. Shook, MC, Surgeon, Services of Supply, North African theater.

However, in one area a modified ammunition cart proved invaluable in carrying medical supplies to battalion aid stations, which as a result were able to function closer to the front than would have otherwise been possible.[20]

After redeployment of 100,000 men and equipment of the II Corps as the enemy withdrew toward Bizerte, various problems of medical supply came to the attention of Maj. (later Lt. Col.) Ervin H. Markus, MC, Medical Supply Officer of the Eastern Base Section. As of 1 May 1943, II Corps was supplied with one combat medical maintenance unit every 5 days; this was augmented by TBA (table of basic allowance) shortage replacements that were requisitioned every 2 weeks. Many items were critically short, the most serious being dental items, because of shortages in the United States, limitation in medical maintenance units, and severe combat losses experienced in the Tunisia Campaign.

It was apparent in such an operation that initial depot stocks should include provision for replacement of combat losses of all basic medical equipment. Losses were also attributed to fair wear and tear, deliberate destructions to prevent enemy seizure, losses at sea, and theft. Losses at sea were made up automatically by the U.S. port, but delays necessarily ensued, thus slowing down the reequipping of arriving units. Adding to all these problems was the

[20] Recollections of Lt. Col. Douglas Hesford, MSC, included in an early draft of this chapter.

further task of supplying units arriving with shortages in basic equipment. It was not until June 1943, after the Tunisia Campaign had ended, that units began receiving their full authorization of equipment. By August 1943, more than 1,400 tons of medical supplies were on hand in the Eastern Base Section, units were well equipped, and critical shortages were virtually nonexistent. Consolidation of equipment was accomplished and, by the close of 1943, all medical supplies were received, stored, and issued at one location, the Mateur depot operated by the 7th Medical Depot Company.[21]

FORMATION OF SERVICES OF SUPPLY

A high point in the logistical effort to support the Mediterranean campaigns was the activation of SOS, NATOUSA, on 15 February 1943 in Oran.[22] Lack of coordination between the base sections made this move necessary. The Medical Section of SOS, NATOUSA, was organized by Colonel Finley, medical supply officer of the Atlantic Base Section, who was followed in May by Col. Benjamin Norris, MC. In August, Col. Charles F. Shook, MC (fig. 49), became SOS Surgeon. The new organization assumed the function of centralized stock control and made all requisitions on the port of embarkation while maintaining necessary stock levels in the various supply depots of the theater.

Centralized Operations

The strength of the Medical Section, SOS, soon began to make itself felt in medical supply operations of the theater. By operating with base section medical supply officers, theater medical supply activities took on coordinated order and purpose. Conferences were held with hospital commanders, chiefs of professional services, and medical supply officers to reassure them in matters of medical supply.

Perhaps the most significant contribution made to medical supply by the Services of Supply was the establishment of a theaterwide central stock control system, which was inaugurated when SOS assumed responsibility for editing requisitions sent to the Zone of Interior.

Coincident with this was the development of item replacement rates for the theater, based on 90 days, in lieu of those developed by the War Department. Control of incoming shipments and intertheater shipments was also a significant feature. In the meantime, the theater had notified the Surgeon General's Office of the imbalanced stock position resulting from medical maintenance units and requested a one-time shipment of a balanced depot stock. The shipment arrived in late 1943 and helped to balance theater stocks of medical supplies and to fill any quick requisition for these supplies in any part of the theater.[23]

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[21] See footnote 18(2), p. 216.
[22] General Order No. 6, NATOUSA, 14 Feb. 1943.
[23] Annual Report, Medical Section, SOS, NATOUSA, 1943.

FIGURE 50.—U.S. lend-lease equipment and supplies, turned over to the French Army and warehoused in Casablanca, April 1943.

Medical Supply and Aid to the French

As soon as the North African landings had been completed and the French surrender was made final, the Allies wasted no time in gaining complete French support. Under the direction of the Joint Rearmament Committee, the reequipment of the French was accomplished in three phases, the first having as its goal the supply of forces for the defense of North and West Africa.

Supplies for the French began arriving in early April 1943, and the U.S. bases were then instructed to assist with the reception, storage, assembly, and issue of serviceable equipment (fig. 50). French technical personnel, attached to those base section service units which handled equipment for delivery to French units undergoing resupply, were instructed in supply procedure by 2d Lt. (later Capt.) Douglas Hesford, MSC, of the Mediterranean Base Section, and 1st Lt. (later Maj.) Alexander F. Striker, SnC, of the SOS medical section. Several warehouses were occupied by the French, but followed U.S. procedures. All tricolor marked supplies were turned over to them. By the time responsibility for resupply of the French was turned over to the Fifth U.S. Army, supplies for 1 month for 100,000 men had been built up in the Oran warehouse.[24]

[24] (1) See footnote 4(1), p. 205. (2) Notes on Conference Concerning Supply of French Expeditionary Corps, held at Headquarters, SOS, NATOUSA, 29 Sept. 1943.

ISLAND CAMPAIGNS

Preliminary Planning

Contrasting sharply with the lack of detailed planning and poor communications of the North African campaign, planning for the invasion of Sicily, begun as a result of the British and American conference held at the Anfa Hotel near Casablanca in January 1943, was thorough and centralized. Plans which were approved on 13 May 1943 established the reconstituted 1st Armored Corps, designated "Force 343," as the American element of the invasion force.

Under the direction of Col. L. Holmes Ginn, Jr., MC, who left the 1st Armored Division to become Surgeon, 15th Army Group, and Col. Richard T. Arnest, MC, II Corps Surgeon, results of Operation TORCH were closely scrutinized, and issue and maintenance requirements were established. Maj. (later Lt. Col.) Howard C. Jones, SnC, of the SOS medical section, and Major Lapp, of the Mediterranean Base Section, were the officers principally responsible for medical supply planning and coordination with the preinvasion training which was taking place at Mostaganem, Algeria, in April 1943. Plans had to provide for supply over the beaches for a period of 30 days because of the lack of a readily available port. The first supply convoy which was to originate in the United States was scheduled to arrive at D+14 after a port was secured.

In an AFHQ (Allied Forces Headquarters) communication of 28 March 1943, items estimated to be essential were listed, and those not in stock or on order were to be requisitioned from the United States. All items requisitioned by Force 343 that could be furnished from theater stocks were extracted to base sections for packing and marking, while the remainder were to be held in the Zone of Interior under receipt of disposition instructions. Limited shipping space made it necessary to mount the invasion in three separate convoys, landing at 4-day intervals. If beach resupply should prove inadequate, arrangements were made for the partial use of the port of Syracuse (in the British area) after D+14.

After carefully studying the lessons learned from the North African invasion, planners decided that medical units would land with unit equipment plus special supply items, such as blood plasma, extra morphine Syrettes, and dressings. A balanced stock of medical supplies for a 7-day maintenance of the forces (fig. 51) was to be unloaded on the beaches on D-day. Medical supply dumps were to be established in widely dispersed, yet protected, points on the beaches immediately after the landing of assault groups.

Under the supervision of the beach surgeon, property exchange was to be accomplished on the beaches before supplies were moved forward.

The first followup convoy was to carry a 7-day maintenance in addition to its own 7-day maintenance. The second followup group was to carry a 7-day maintenance for the assault group and a 7-day maintenance for the first followup in addition to its own 7-day maintenance, except II Corps, which

FIGURE 51.—This beach medical maintenance unit, which derived its stocks from the standard unit, embraced those items and quantities that would best support an amphibious operation, such as that in Sicily.

was to carry a 14-day maintenance. Each subsequent followup was to bring in a 7-day maintenance plus 7 days for troops in, up to five followup convoys previously landed.

Special items, such as sunburn cream and seasick capsules, were to be drawn and issued before embarkation. Thirty days' combat maintenance of certain expendable supplies and pest control materials was to be prepared by SOS, NATOUSA, or the New York Port of Embarkation, and was to be available on call of the Commanding General, Force 343.

An additional 30 to 60 days' maintenance was to be laid down by the Surgeon, SOS, NATOUSA, on call of the Commanding General, Force 343, to be built up in Sicily. A 10-day supply for troops of subtask forces served by beaches was to be available by D+32, and a 20-day supply for all troops by D+90.

The Force 343 surgeon was to requisition special supplies from the Eastern Base Section, whose surgeon was responsible for preparing supplies for shipment and delivery to ports.

Hospital ships and carriers were authorized to transport medical supplies, and were used to replenish stocks and to handle property exchange of items of equipment returned to North Africa with patients evacuated by air. As a secondary benefit, this procedure helped relieve the shortage of shipping space.

Emergency requisitions were to be placed in the same manner as those for other supplies. Force 343, however, was to give resulting shipments a priority in their daily requests for air transportation. Moreover, the Eastern Base Section surgeon was to maintain a small medical supply dump in the vicinity of Kairouan, Tunisia, to contain a balanced stock of those items typically required for emergency air shipments.[25]

Sicily Campaign

With plans completed, the pick-and-shovel work of medical supply support began, the main burden of packing and marking falling on the 2d Medical Supply Depot at Oran (fig. 52), which ran an around-the-clock operation for 2 months.

The advance detachment of the 4th Medical Supply Depot, which had been operating at Ain M'Lila, Algeria, was ordered to Ferryville, Tunisia, on 1 June 1943, where it operated around the clock, supplying task force units destined to make the Sicilian invasion. On 7 July, the dump was closed, and the unit (3 officers and 42 enlisted men) moved to Sicily, attached to the 3d Division, and landed at Licata on 12 July 1943.[26]

The 1st Advance Section of the 2d Medical Supply Depot remained near Algiers until 8 July, when it was attached to the 1st Division and subsequently landed near Gela, Sicily, on 13 July.[27]

After a period of heavy bombardment, the amphibious assault on Sicily began on 10 July. Despite the destruction of 20 percent of the landing craft by heavy seas, all beaches on the southern shore were secure by the end of the first day.

The landing of medical personnel at Gela was unduly delayed because of heavy opposition and lack of unit equipment on the beach. A clearing station of the 1st Medical Battalion was established, but was hampered by the lack of necessary equipment. A significant amount of medical equipment, including ambulances, was lost at sea as a result of rough landings and enemy action. These setbacks handicapped hard-pressed medical units, but did not seriously hinder supply support in general.[28]

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[25] (1) Report of Operations of the Seventh U.S. Army in the Sicilian Campaign, 10 July to 17 August 1943. Part I—Summary of Operations. [Official record.] (2) Headquarters, I Armored Corps (Reinf.), Annex No. 2 to Administrative Order No. 1, "Medical, Part 3, Supply," 14 June 1943.

[26] See footnotes 11, p. 210; and 18(2), p. 216.

[27] (1) See footnote 11, p. 210. (2) Irwin, Lawrence J.: Medical Supply Field Operations, 10 Aug. 1945. [Official record.]

[28] (1) See footnote 25(1), above. (2) Wiltse, Charles M.: The Medical Department: Medical Service in the Mediterranean and Minor Theaters. United States Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1965. (3) Report, Col. Richard T. Arnest, MC, Surgeon, II Corps, to The Surgeon General (through channels), dated 30 Aug. 1943, subject: Report of Medical Activities; Sicilian Campaign.

FIGURE 52.—The box shop in Oran was extremely productive, providing boxes for amphibious operations in Sicily and Italy. Note the saw is powered by a vehicle motor.

The end of the amphibious phase on 16 July was followed by the rapid advance of the Seventh U.S. Army, which made it very difficult for medical units to keep pace. However, support never faded as the drive carried forward until 22 July, when Palermo fell to the Americans. The Sicily Campaign came to a close with the fall of Messina on 17 August 1943.

In spite of the careful planning and preparation, anticipated shortages of certain items, such as tincture of opium, glycyrrhiza and opium tablets, sulfaguanidine tablets, hydrogen peroxide, litters, blankets, mercury, some surgical and dental instruments, and canvas cots, did occur.

Approximately 110 tons of medical supplies were landed on 16 beaches between D-day and D+2. These initial supply loads consisted of combat medical maintenance units, heavily augmented by items which experience in North Africa had shown to be required. Medical supplies and equipment were unloaded on the beaches in haphazard fashion, and were later picked up by the beach group personnel, who issued them as needed until medical supply depot personnel came ashore. In the Scoglitti area, medical supplies were so widely scattered on the beaches that collecting them was a slow and difficult task.

Map 5.—Medical supply depots in Sicily, July-August 1943.

About 10 percent of the initial medical supply load in all areas was lost because of enemy action.

At Gela, the 1st Advance Section of the 2d Medical Supply Depot established its first distribution point, which was stocked with supplies taken over from the beach group or later taken from the beaches. To accomplish this, the depot borrowed trucks from the 1st Medical Battalion while waiting for their own transportation to be unloaded.

The movement of the various supply depots (map 5), which were operated by sections of the 2d and 4th Medical Supply Depots, was indicative of the fast pace at which the combat situation developed. All medical supplies unloaded in Sicily were received, segregated, inventoried, and moved to appropriate distribution points, which were each stocked with 15 to 20 tons of balanced medical supplies and located as near the combat elements as the tactical situation would permit.

During the course of the campaign, several Italian medical supply dumps and military hospitals were captured. Some material found in these installations was adaptable for treatment of civilians and prisoners of war.

In spite of shortcomings and difficulties, medical supply support for the Sicily Campaign proved to be satisfactory because of careful preparation. Requisitioning of medical supplies and equipment estimated to be adequate for current maintenance plus a 30-day reserve was ultimately phased in on followup convoys from the United States. Acute shortages were satisfied by

emergency requisitions on base depots in North Africa, with air delivery of urgent requirements. The first such emergency requisition was for litters to replace those lost due to the failure of property exchange with hospital ships and air transports involved in the evacuation of patients during the first week. Because this failure occurred along the entire chain of evacuation, these items were constantly flowing to the rear and piling up. Canvas cots, also among the first emergency requirements, were needed to support extensive bed expansion in hospitals.

In preparation for the Sicily Campaign, a 1- by 1- by 3-ft. box was designed to provide uniformity for ease of storing and as a container one man could handle. A strip of wood was nailed across each end to afford a handle. Although the objective was practical and realistic, boxes were inadequately constructed because of the scarcity and poor quality of materials available in North Africa. Therefore, much of the advantage to be gained was outweighed by the large number of broken boxes arriving at Sicilian supply points.

To counteract the flagrant rifling of supplies, it was recommended that cases containing whisky be marked with a code known only to shipping and receiving depot personnel.[29]

Lack of coordination between the elements making the beachhead landing resulted in the breakdown of the property exchange system. Directives had been issued to leave all unused litters, blankets, and splints on the beaches. The Seventh U.S. Army medical supply officer was unable to locate many items which had been handled in this manner. Also, medical supplies scheduled for loading on LST's (landing ships, tank) before their departure from North Africa were never loaded. Medical personnel who were assigned to these ships were also missing. It was all typical of the innumerable, unexplainable aspects of war as no single cause could be identified at the time.[30]

The medical maintenance units were found to be generally adequate, but, again, the quantity of cotton was excessive and out of proportion to the other items supplied. Conversely, camphorated tincture of opium, plaster of paris bandage, and crinoline were furnished in quantities far short of requirements. Also, some "seasonal" items furnished were "out of season" for the time of year the operation took place.

As with other TOE (table of organization and equipment) medical units, medical depots and their elements were constantly hampered by the shortage of organic transportation. Vehicles of the 1st Advance Section of the 2d Medical Supply Depot were late in unloading. In any event, they were insufficient to transport all necessary unit equipment and personnel. Consequently, vehicles were borrowed from any available source.[31]

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[29] (1) Letter, Capt. Charles D. McDonald, MSC, to Medical Supply Officer, Seventh U.S. Army, 25 Sept. 1943, subject: Medical Supply During Sicilian Campaign. (2) See footnotes 8(3), p. 208; and 25(1), p. 223.

[30] Letter, Col. L. Holmes Ginn, Jr., MC, Surgeon, 15th Army Group, to Brig. Gen. A. L. Hamblen, AFHQ, 20 July 1943, subject: Report of Visit to Sicily.

[31] See footnote 25(1), p. 223.

Following the successful conclusion of the Sicily Campaign, the Island Base Section was activated at Palermo on 1 September 1943, thereby perpetuating the process of base section employment.

With the capture of Sicily, the Allies had achieved a springboard to Italy and the Continent, and no time was lost in using Sicily for this purpose. On 9 September 1943, initial landings took place at Salerno.

ASSAULT ON ITALY

Fifth U.S. Army Plans and Preparations

The Fifth U.S. Army, which was activated on 5 January 1943, at Oujda, French Morocco, began planning Operation AVALANCHE, the Salerno invasion, in July 1943. A target date of 7 September 1943 was set. The medical supply planning team of SOS-Mediterranean Base Section, so effective in the Sicily Campaign, joined with other Army personnel in planning the invasion of Italy.

Medical units were selected, tonnages were computed and phased, and requisitions were prepared for convoys through D+24. A supply level of 14 days was scheduled to be achieved by D+12. Supplies consisted of medical maintenance units, augmented by special items, such as plasma, litters, blankets, Atabrine, plaster of paris, and biologicals.

Experience developed in Sicily and the lessons learned in the Tunisia Campaign were integrated into Fifth U.S. Army medical supply planning. All medical units were to carry ashore their full TBA material, with selected units designated to carry additional special supplies and equipment. A medical supply dump was to be established on the beach and absorbed by medical depot personnel scheduled for early landing. Initially, no forward delivery of supplies was planned because of the extremely limited number of supply personnel in the assault phase. The depot group was to establish forward supply points as necessary and, later, to operate a depot to serve the entire force. Medical units landing with the assault force were to carry extra wheeled litter carriers, litters, blankets, Medical Department chests No. 2, splint sets, and other selected medical supplies and equipment. The splint sets, which were to be taken ashore in specially prepared waterproof containers by unit medical personnel, consisted of dressings, gauze, bandages, cotton, crystalline sulfanilamide, morphine Syrettes, blood plasma, sulfadiazine ointment and tablets, halazone tablets, together with specially prepared sterile packets of fine mesh gauze impregnated with boric acid or Vaseline ointment. The waterproofed packs containing these items weighed 70 pounds and could float while supporting a man in water. In addition, unit personnel each carried 13 units of plasma in the bottom extension of the individual medical kit. Contents of the kit not expended during the assault phase were to be delivered to the beach

FIGURE 53.—Landing craft, infantry, unloading supplies, Italy, September 1943.

medical supply depot, a feature which was an application of a recommendation made following the initial landing experience in North Africa.[32]

Salerno Landings

The 4th Medical Supply Depot and the 12th Medical Depot Company were selected for the Salerno operation, and a detachment of the 4th landed with the assault force on D-day. Because of heavily mined beaches and intense enemy artillery fire, depot personnel could do little but dig in until midafternoon when beaches were cleared of mines up to ¼ mile inland. Portable airstrip landing mats of wire were laid on the sands so that supply vehicles could operate freely. Because certain medical supplies brought in by invasion barges were dumped into the water near the shore, depot personnel had difficulty locating them and fishing them out.

On D-day, more than 100 tons of medical supplies were unloaded, secured, segregated by class, and stored at one location while an issue point was located at another spot (fig. 53). A total of 200 tons of unit equipment for the 16th and 95th Evacuation Hospitals was gathered and held by the depot group

[32] (1) Annual Report, Surgeon, Fifth U.S. Army, 1943. (2) Wiltse, Charles M.: The Medical Department: Medical Service in the Mediterranean and Minor Theaters. United States Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1965, pp. 251–252.

pending arrival of unit personnel. This was a rare instance where equipment of major medical units preceded unit personnel in landing.

By D+4, all personnel of the 4th Medical Depot detachment had arrived and supply tonnages had doubled. During the first month, the depot commendably filled 1,102 requisitions while maintaining a detailed inventory of supplies.

As in most other beach operations up to this time, the unpredictable event was the chief cause of difficulty. In the Salerno landings, large quantities of gauze, cotton, adhesive tape, and medications were lost in the water. Transports carrying medical supplies and equipment were sunk while many items such as fluoroscopic screens, X-ray equipment, darkroom tents, and Coleman stoves were lost or damaged in transit.[33]

With the experience of Sicily behind it, the SOS organization responded quickly to the urgent requirements of the new beachhead. The Salerno landings were accomplished with this more fully developed advantage. Requisitions for shortages were radioed from the beaches to SOS in North Africa where resources of the theater could be employed in support.

It was not until 20 September 1943 that the beachhead was finally secured and the advance proceeded toward Naples and beyond the Volturno River. On 4 October, the 12th Medical Depot Company, commanded by Maj. (later Lt. Col.) George P. Wilson, MSC, replaced the 4th Medical Supply Depot detachment as the medical depot of the Fifth U.S. Army and took custody of the 50 tons of medical supplies on hand. The detachment then rejoined its parent organization, which, by this time, had established a base depot in Naples (fig. 54) following its arrival from North Africa.

The 12th Medical Depot was based on the Naples depot for support; however, the latter did not open until 15 October and, because of inadequate stock, full support of the 12th was not possible. Meanwhile, the 12th operated a depot first at Avellino on 11 October and, on 25 October, at Caserta. These locations were advantageous because most medical units being supported were concentrated in that area, and the tactical situation warranted it. By 17 December 1943 (map 6), the 12th was supporting a troop strength of 225,000 from a depot operated at Riardo and another containing some 120 tons of supplies and equipment set up in a monastery near Calvi Risorta.[34]

Peninsular Base Section

Meanwhile, the 4th Medical Supply Depot had established a forward dump at Secondigliano just north of Naples on 10 October (map 6). On 1 November 1943, the base element of the 4th was assigned to the Peninsular Base Section at Naples. With a wealth of experience to its credit, this unit quickly adapted itself to the necessity of running a base depot. During this period and up to January 1944, it handled a large input of supplies from

[33] See footnotes 11, p. 210; and 32(1), p. 228.

[34] Annual Report, 12th Medical Depot Company, 1943.

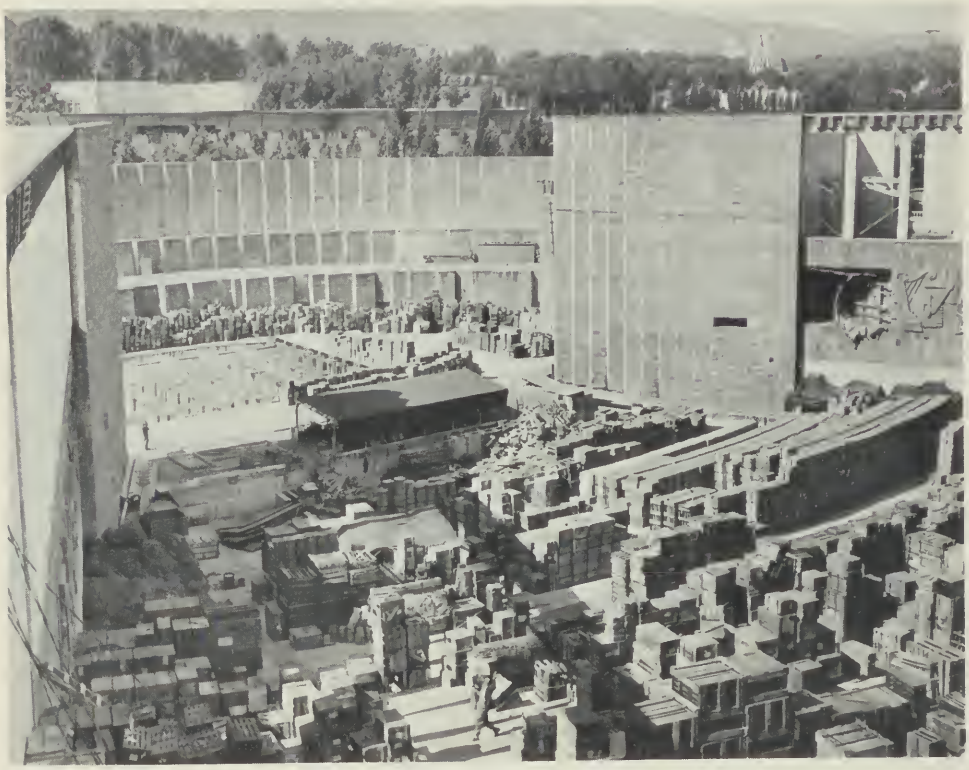

FIGURE 54.—Naples Fair Grounds served as a medical depot site.

North Africa and the United States and sustained the 12th Medical Depot Company and surrounding medical units (fig. 55) despite heavy air attacks which failed to interrupt operations to a damaging extent.

The 4th Medical Depot Company for the first time was forced to hire civilian laborers when a reorganization stripped it of 16 trained enlisted men. Meanwhile, crowded conditions caused another dump, called Dump 352, to be opened in the munitions factory tunnels located in the outskirts of Bagnoli. This new installation supported combat operations as well as several large medical treatment complexes.

At this point, it is to be noted that the theater was then operating two major medical depot systems: one represented by the 4th Medical Supply Depot in the Peninsular Base Section in Italy and the other by the 2d Medical Supply Depot in Oran, which was carrying tremendous operating stocks and reserves for the entire theater.

Adriatic Depot

In addition to the supply depots of the Peninsular Base Section, a depot was established by a detachment of the 4th Medical Depot Company at Bari,

Map 6.—Movement of the 4th Medical Supply Depot and the 12th Medical Depot Company in Italy, 7 September–17 December 1943.

Italy, in October 1943. This depot functioned as support for Air Force and supporting troops until 20 March 1944, when it was turned over to the Medical Section, Army Air Forces Service Command. Supply responsibility was then handled by the Air Force in direct contact with the Zone of Interior.[35]

Anzio Operation

The 1st Advance Platoon of the 12th Medical Depot Company, after a secret move to Naples, was attached to VI Corps, then preparing for the Anzio operation. Again, this platoon was scheduled for D-day landings, but this time it immediately followed shore engineer battalions to keep medical depot stocks and unit equipment separate from supplies and equipment of

[35] See footnote 11, p. 210. (2) Annual Report, Army Air Force Service Command, Mediterranean Theater of Operations, 1944.

FIGURE 55.—Medical supply, 300th General Hospital, Naples, Italy.

other elements during the early hours on the beach. Again, shipping space was at a premium and, along with enemy action, the lack of it cut into supply and equipment levels.

Refinements in packing and loading of supplies were incorporated into the landing preparations while better features of the more recent Salerno operation were also adopted. Increased supply levels, improved requisitioning procedures, special items, and property exchange were adequately provided. Allied Forces Headquarters arranged for hospital ships to maintain a reserve of litters, blankets, and splints, while naval landing craft carried equipment to augment and further insure uninterrupted property exchange in patient evacuation. As an added feature, combat commanders were directed to establish guards over any enemy medical facilities or supplies encountered in the advance to prevent looting and preserve their serviceability for use in caring for prisoners of war. This was no doubt prompted by problems encountered in North Africa when it became the duty of some U.S. medical units to treat prisoner-of-war patients at a time when supplies, equipment, and medical facilities were at a premium.[36]

Arriving on the beach with the second assault wave on 22 January 1944, the 1st Advance Platoon of the 12th Medical Depot Company, commanded by Capt. (later Maj.) Richard P. Gilbert, MSC, had a temporary beach dump

[36] Annual Report, Surgeon, Fifth [U.S.] Army, 1944.

in operation by 0700 hours on D+1. Gathering supplies was no problem then because all that had arrived were several hundred blankets. On the following day, the dump was moved to a more permanent site on a hill near the Anzio-Albano road.

Depot facilities consisted of a four-story building, 70- by 40-ft., which accommodated the headquarters, issue room, shipping section, and living quarters as well as two storage tents which were arranged so the large red crosses would be clearly visible to the enemy.

At first, supplies were distributed equally and stacked by class; however, the constant threat of shelling and bombing made it necessary to distribute the most important items of supply in several areas to avoid complete destruction of any one particular item. This was a rather complicated arrangement of stockpiles, but was worth the effort involved.

Despite the absence of unloading facilities on the beachhead during the first 5 days, medical supply operations were sustained during this period by the supplies carried in by combat and service units. These supplies were transported on the vehicles organic to the various units or often carried in mortar shell cases (fig. 56), and either dropped on the beach or carried to the supply dump.

By D+6, the first shipment of medical maintenance units packed by the 4th Medical Depot Company in Bagnoli was completely unloaded. Because of difficulty in item identification, the British maintenance units which were included were turned over to a British casualty clearing station.

Once again, despite precautionary efforts, property exchange in patient evacuation broke down on the beaches because LST's and other ships did not return with litter and blankets as expected. Unfortunately, large quantities of such items had been allowed to accumulate in Naples. This problem was solved by requiring litter bearers unloading patients in Naples to return a litter and blanket to the LST for each patient removed.[37]

Because of heavy seas and shallow beaches which prevented proper landing or docking, emergency requisitions were dispatched to Naples where LST's were loaded, transported to Anzio, and landed directly on the beaches. With improved weather conditions, ships in the harbor were soon unloaded and large surpluses began to accumulate in the depot. To handle this unmanageable workload, 20 Italian civilians were hired. All supplies were tallied and stored by D+15. To offset the constant turnover of the indigenous work force, a detachment of Italian soldiers was employed, but with no better results. Finally, the problem was solved by the assignment of 12 U.S. soldiers to the depot.

Harassed by air raids and shelling, the depot nevertheless processed requisitions in rapid time. Emergency requisitions for such items as distilled

[37] (1) Gilbert, Richard P.: Combat Medical Supply Operations—the Anzio Beachhead. [Official record.] (2) Wiltse, Charles M.: The Medical Department: Medical Service in the Mediterranean and Minor Theaters. United States Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1965.

FIGURE 56.—Mortar shell cases used at Anzio.

water, dextrose, and normal saline solutions, as well as essential items of equipment, were sent to the Peninsular Base Section to make up for hoarding and heavy losses of hospital equipment on the beaches. These supplies were rigidly controlled by the depot while items of equipment vitally essential to hospital operation were maintained in depot stock. Hospital equipment was not stocked according to usual procedure, but there was no other way to make equipment immediately available. Rapid delivery of replacement items from Naples was successfully accomplished.

A steady flow of supplies into Anzio was maintained by use of every conceivable form of transportation ranging from Piper Cub to transports, destroyers, LCT's (landing craft, tank), and LST's. Consequently, by 24 April 1944, a 93-day reserve of supplies was on hand. Again contrary to expectation, the boxes for medical supplies failed to hold up. By this time, the more

"popular" medical stock numbers stenciled on the boxes were well known to our troops, and whisky and narcotics again became a prime target of looters. Looting in Italy, in contrast to that in North Africa, was negligible. Difficulty was experienced in locating box numbers or the box which carried the master packing lists of a shipment. The inadequacy of the tables of organization and equipment for a storage and issue platoon of a medical depot company was a problem.

Between 23 January and 7 June 1944, the 1st Advance Platoon of the 12th Medical Depot Company, while operating the supply point for the Anzio beachhead, handled 842 tons of supplies and equipment, of which 610 tons were issued and 232 tons transferred. In keeping with the superior performance of the medical service as a whole, this was a highly significant accomplishment for a small depot section operating under severest handicaps.

ROME-ARNO CAMPAIGN

Fifth U.S. Army Medical Service

U.S. medical units were regrouping near Carinola to support the Fifth U.S. Army in the spring offensive which was launched before midnight on 11 May 1944.

While the 1st Platoon of the 12th Medical Depot Company was supporting the Anzio beachhead, its 2d Platoon moved from the base depot at Calvi Risorta on 20 April to the town of Nocelleto before the Fifth U.S. Army attack. By this date, the unit was supporting a new Fifth U.S. Army area in which the troop strength had been increased to approximately 201,000. With the attack, the platoon again moved rapidly; first to Itri, then on to Rome by 9 June and Piombino by 28 June, finally reaching the vicinity of Florence on 31 August 1944.

Meanwhile the 1st Platoon, after reverting to company control when joined by the base section on 7 June, moved from Anzio to Civitavecchia on 11 June and to Cecina on 9 July. While in the Civitavecchia and Cecina areas, the 1st Platoon experienced great difficulty in obtaining supplies from its parent base section which had replaced it at Anzio. The small amount of supplies sent from Anzio, supplies flown in from Naples, and a limited amount of supplies remaining at Civitavecchia comprised the total stock available for the Rome-Arno offensive. Consequently, it would seem that were it not for excesses inadvertently built up during the early days at the Anzio beachhead, medical units could have experienced serious supply shortages during those crucial first few weeks of the campaign.[38]

During the Rome-Arno Campaign, the 12th Medical Depot Company was reorganized, its three platoons being redesigned storage and issue platoons (fig. 57 A and B). Throughout the campaign, one platoon supported each of

[38] (1) Annual Report, 12th Medical Depot Company, 1944. (2) See footnote 37(1), p. 233. (3) Mial, Marcel H.: Fifth Army Medical Supply Activities, 1 August 1943–1 August 1944, dated 28 Aug. 1944. [Official record.]

FIGURE 57.—The 12th Medical Depot Company, Fifth U.S. Army, Volterra area, Italy, 9 August 1944: A. Two storage tents. B. Loose issue tent.

Map 7.—Medical supply depots in Italy, 6 January–17 September 1944.

the two U.S. corps engaged, while the base element maintained a position accessible to both (map 7). Problems of delivering supplies over rugged terrain were solved by using every conceivable means of transportation, including pack animals and sleds.

During the period up to 11 September 1944, the 12th had operated entirely under canvas. As a result, supplies and equipment were subjected to the rigors of wind, dust, rain, and general dampness, which made operations unsatisfactory and costly.[39]

[39] Wiltse, Charles M.: The Medical Department: Medical Service in the Mediterranean and Minor Theaters. United States Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1965.

On 17 August 1944, regular requisitioning in the Peninsular Base Section was established by the Fifth U.S. Army. The use of War Department replacement factors, introduced as a means of determining medical supply requirements relative to troop strengths to be supported, had little effect on Fifth U.S. Army's medical stock position during the Rome-Arno Campaign. During the campaign, U.S. medical supply support was furnished to French, Brazilian, and various British units, and on occasion to Italian troops, as well as Fifth U.S. Army Forces. Where Allied troops were concerned, delicate political questions required equal delicacy in deciding when and what medical supplies could be spared for Allied troops.

The sensitivity of this situation was recognized by Brig. Gen. Joseph I. Martin, Surgeon, Fifth U.S. Army, and he manifested this in his policies. Expendable supplies going to U.S. troops were drawn directly from the depot; however, nonexpendables were processed through the Fifth U.S. Army medical supply officer, Colonel Mial, for control purposes before depot action, as were all requisitions from Allied units. Approved requisitions for the French were forwarded to the depot, which in turn transferred the specified material directly to the French medical supply depot which effected proper distribution. For the Brazilian units, Colonel Mial forwarded approved requisitions to the 12th Medical Depot Company for issue directly to the Brazilian units concerned.

It was observed that there was widespread hoarding by all organizations, which in some instances threatened their mobility. At this point in the war, units had become familiar with the unreliability of the forward movement of supplies. Although not to be condoned, their hoarding was not entirely without explanation. To cope with these problems, the Army Surgeon directed that a vigorous supply discipline program be implemented in the Fifth U.S. Army.

As a device to conserve medical equipment, a novel feature was employed to provide Allied units with equipment in excess of authorized allowances. In particular, when a request was found justified, the Army Surgeon authorized the issue to a nearby U.S. unit, which in turn released it on hand-receipt to the Allied unit. Emergency issues were always made without question. Such occasions were frequent, particularly as a result of destruction of supplies and equipment by the elements.

The Army Surgeon also exercised scrutiny of depot inventories, while records on the location of all medical equipment used in Fifth U.S. Army units were kept by his medical supply officer. Such extensive control of material was, perhaps, the most detailed procedure used in a combat area in the entire Mediterranean theater.[40]

Services of Supply Support

In February 1944, a realinement converted the year-old SOS, NATOUSA, into a true communications zone organization. Colonel Shook remained as

[40] (1) Administrative Directive No. 49, Headquarters, Fifth U.S. Army, 17 Aug. 1944, subject: Basis for Editing Class II Requisitions. (2) See footnote 36, p. 232.

FIGURE 58.—Two general hospital assemblies, stored under tarps at Oran as reserves, came into ready use as replacement for hospital assemblies lost during the bombing raid of Bari Harbor in December 1943.

Communications Zone Surgeon, with an enlarged staff to carry out his expanded functions. Lt. Col. (later Col.) Joseph G. Cocke, MC, became Colonel Shook's deputy in April, and Lt. Col. (later Col.) Jenner G. Jones, MC, was placed in charge of the medical supply branch. Although the communications zone medical section took over many activities for which the theater surgeon had previously been responsible, such as hospitalization and evacuation, working relations between the two groups continued to be harmonious.

Control of the base sections, also, passed to the communications zone early in 1944, together with base section supply problems. For example, most of the 2,000 tons of stock on hand in the Peninsular Base Section consisted of medical maintenance unit components. Stocks of hospital equipment, such as would be specially requisitioned through SOS, NATOUSA, were strictly limited.

On 5 January, Services of Supply assumed responsibility for supplying the various base sections in the theater and for keeping theater stocks properly balanced. Due-in records were maintained by Peninsular Base Section, utilizing SOS requisitions as sources of information. These requisitions were themselves based on the semimonthly inventory reports.

Extremes and urgency of support that SOS encountered were exemplified by the German attack on ships anchored off Bari, in December 1943, causing the loss of one general hospital assembly, two station hospital assemblies, and two field hospital assemblies. This would have been a catastrophe if SOS had not previously chosen to disregard instructions from the Zone of Interior to dismantle two general hospital assemblies stored under tarps at the Oran Medical Depot (fig. 58). Components of these assemblies comprised the bulk of immediate replacements.

FIGURE 59.—Walk-in refrigerators (with generators) at the medical depot in Oran were used as shipping containers from the United States for a large shipment of medical refrigerated items, and delivered to the depot site intact to serve as theater refrigerated storage.

During the summer of 1944, the Peninsular Base Section found itself not only supporting the Rome-Arno offensive of the Fifth U.S. Army, but equipping and reequipping units of the VI Corps in addition to providing resupply requirements for the southern France beachhead forces. During July and August, the latter requirements amounted to 184 tons of medical supplies and equipment.

The peak of activity for SOS, NATOUSA, and other major headquarters was the summer of 1944. An infinite variety of relatively unpublicized supply problems were arising and being solved. For example, shipment of dated items requiring refrigeration en route to, and while stored in, theater depots had been a problem from the beginning. Refrigerated space on ships was always overcrowded and inadequate. To solve both problems, SOS arranged with the New York Port of Embarkation to have appropriate shipments packed into Engineer Corps knocked-down, walk-in type refrigerators, which in turn were loaded aboard ship, intact. On arrival, the loaded refrigerators were delivered intact to depots (fig. 59). Thus, adequate storage in transit plus continued storage on arrival at the depot were assured, while uniform expansion of the theater refrigerated storage capacity was achieved concurrently.[41]

Support through Leghorn.—Tonnage of medical supplies in the Peninsular Base Section grew from 2,000 tons in January to 6,000 tons by August

[41] (1) Annual Report, Peninsular Base Section, 1944. (2) For a more detailed description of the organization of the medical service in the Mediterranean theater, see The Medical Department, United States Army. Organization and Administration in World War II. Washington: U.S. Government Printing Office, 1963.

FIGURE 60.—U.S. Army Medical Depot, Leghorn, Italy, bounded by buildings marked with the Geneva Cross on the right and left.

1944. With Leghorn captured, this base section acquired a supply base fully capable of filling all Fifth U.S. Army needs. Stocks were rapidly built up so that by the year's end, tonnages of medical materiel in Leghorn were equal to those carried in Naples (fig. 60). This was accomplished not without considerable difficulty as the actual point of receipt of individual items could not be predicted more than 10 days in advance of unloading. Problems arising out of necessity for transshipment were substantial.

The 4th Medical Depot Company, base depot for the Peninsular Base Section, continued operation at Bagnoli. By April 1944, tonnage had increased to 4,000 tons and issues reached an aggregate of 1,000 tons a month. During the Rome-Arno Campaign, the activity of the 4th increased markedly to a peak in May, when 2,228 requisitions were filled.

Preparations to move North African bases.—Characteristic of operations in the theater as the war moved closer to the enemy heartland, base section operations of earlier campaigns gradually consolidated and phased out of operation. Consequently, excess stocks in North Africa were shipped to the Peninsular Base Section. A large shipment from the Eastern Base Section arrived simultaneously with an 8,000-package shipment from the Mediterranean Base Section. This deluge was a backbreaking task to handle, but in 6 days, the 4th Medical Depot Company had it all recorded and warehoused.

This and other depot workloads could not have been accomplished with the 136 men authorized under new TOE 8–667. Depot personnel who were rendered excess under the earlier reorganization were retained on temporary duty.[42]

Shifting of supply depots in rear areas.—On departure of the base element of the 12th Medical Depot Company from Anzio, it was replaced by the 7th Medical Depot Company, which was at the time assigned to Peninsular Base Section. It operated the Anzio issue point from 11 to 21 June 1944, when it was directed to operate the depot at Civitavecchia. Being relieved by a detachment of the 4th Medical Depot Company, the 7th returned to Naples and, by 1 July, had begun preparations for the forthcoming invasion of southern France.

The supply of troops in the Rome area presented particular problems to the Peninsular Base Section. After considerable delay, a plan was evolved to institute service to these units directly from the Naples depot while the 4th Medical Depot Company detachment at Civitavecchia supplied only units in that immediate vicinity. In addition, the 12th General Hospital in Rome was stocked to distribute supplies to those units in the Rome area.

On 7 July 1944, a group from the Civitavecchia detachment established a small issue point at Piombino. Coincident with this, all medical depots south of the Volturno River were consolidated by 17 July. Operations were thereby centered in Bagnoli while all medical depot operations between the Volturno and Civitavecchia had been eliminated. Meanwhile, the 4th Medical Depot Company had been augmented by the 684th Quartermaster Base Depot Company, which previously had been attached to the 7th Medical Depot Company (map 7) and was further attached to the 4th on relief of the 7th from the Civitavecchia assignment.[43]

SOUTHERN FRANCE CAMPAIGN

Following the capture of Rome on 5 June 1944 and the establishment of Headquarters, SOS, NATOUSA, at Caserta, on 4 July, the Coastal Base Section, with the specific mission to support the invasion of France, was organized. When the invading VI Corps struck the coast of southern France on 15 August 1944, it was accompanied by personnel of the section, now called Continental Base Section, who opened its headquarters at Marseille. To compensate for the long supply line, CONAD (Continental Advance Section), which was established close to the Armies at Dijon, replaced the deactivated Continental Base Section. Delta Base Section was activated simultaneously with headquarters at Marseille. Together CONAD and Delta Base Section constituted SOLOC (Southern Line of Communications), of which Colonel Shook was Surgeon.

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[42] (1) See footnote 41(1), p. 240. (2) Annual Report, 232d Medical Service Battalion, 1944.

[43] (1) Annual Report, 7th Medical Depot Company, 1944. (2) See footnote 42(2), above. (3) Annual Report, 684th Quartermaster Base Depot Company, 1944.

Base Section Medical Supply

During their brief tenure in Marseille, Continental Base Section personnel located an excellent depot site near port and rail facilities, and unloaded and warehoused over 200 tons of medical supplies before the arrival of the 231st Medical Composite Battalion (formerly 2d Medical Supply Depot) on 10 September 1944. At the outset, the base surgeon, who had been supervising beach dump operations, was advised that several ships would unload 200 tons of medical supplies in the near future. Without depot personnel, warehousing, or transportation, the assistant base section medical supply officer took immediate action and, after scouring the city, found a suitable building which he claimed for use as a medical depot. Despite some difficulty unloading the supplies and rounding up needed personnel, all 200 tons of equipment were stored within 15 hours. Under these circumstances, the first medical supplies for base section operation were received, stored by catalog class, and readied for issue within 72 hours of arrival.[44]

With the arrival of the veteran 231st Medical Composite Battalion, commanded by Major Markus, base section depot operations began with vigor. Originally designated Medical Depot 356 (later European theater Depot M–452), it grew to be one of the largest and most ideally operated depots in the theater, with over 255,000 square feet of closed shed and open warehouse space (fig. 61 A and B).

To alleviate the manpower shortage, elements of the 46th and 81st Medical Base Depot Companies and the 320th Medical Service Detachment were attached to the 231st at various times. A mobile optical unit of the 7th Medical Depot Company was attached to the Marseille depot on 10 September to handle optical repair for the base section.

Early Depot Operations

On 16 August 1944, an advance section of the 7th Medical Depot Company, which had been attached to the Seventh U.S. Army for the Southern France Campaign on 13 July, came ashore at Sainte-Maxime, and took over the operation of the three medical supply dumps at Sainte-Maxime, Le Muy, and Saint-Raphaël (fig. 62).

By 25 August, this section, after operating an issue point at Le Cannet, had moved to Saint-Maximin, where it was joined by the main body of the 7th Medical Depot Company (map 8).

Moving rapidly up the Rhône Valley in support of the Seventh U.S. Army offensive, units of the 7th Medical Depot Company briefly operated supply points at Meyrargues, Aspremont (map 8), Voreppe, Sellières, and Baume before the entire company reunited on 20 September at Vesoul (map 9). Here the first permanent depot in southern France was establishd in a

[44] See footnote 41(1), p. 240.

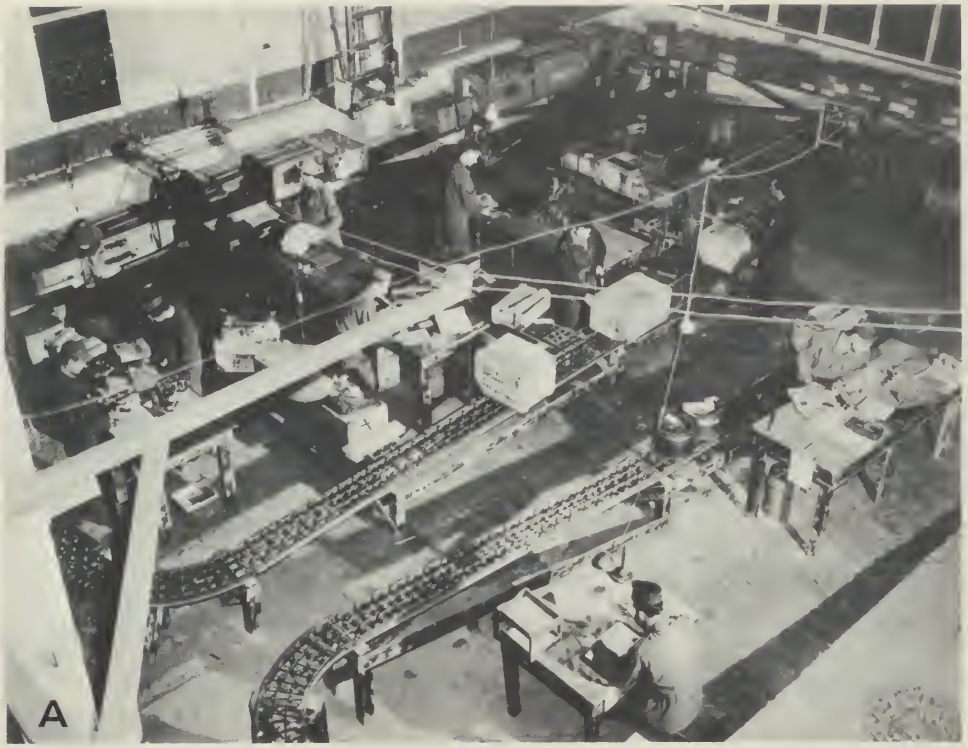

FIGURE 61.—A. Unique inclined ramp with fixed skate conveyor set up to facilitate unloading at Medical Depot M–452, Marseille, France.

large tobacco warehouse, which provided adequate space for storage, issue offices, mess facilities, and billets.[45]

Through the efforts of the 46th Medical Depot Company and Maj. (later Lt. Col.) Oliver A. Parssinen, MAC, modern palletized storage methods and maximum materials-handling equipment were introduced, thus enabling the depot to better support the 6th Army Group.

By 31 October, 444,715 tons of general cargo and 147,231 vehicles had been disembarked in southern France. Because of the improved port, rail, and road facilities, supplies were handled and moved rapidly. Eventually the medical depot developed and maintained a 15-day level of supplies for the Combat Zone and a 15-day level for CONAD.[46]

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[45] (1) Report, 231st Medical Composite Battalion, dated 28 Oct. 1944, subject: Medical Historical Data. (2) See footnote 43(1), p. 242.

[46] (1) Annual Report, 46th Medical Depot Company, 1944. (2) Headquarters, Communications Zone, NATOUSA, Circular Number 113, 6 Oct. 1944. (3) Wiltse, Charles M.: The Medical Department: Medical Service in the Mediterranean and Minor Theaters. United States Army in World War II. The Technical Services. Washington: U.S. Government Printing Office, 1965. (4) See footnote 45(1), above.

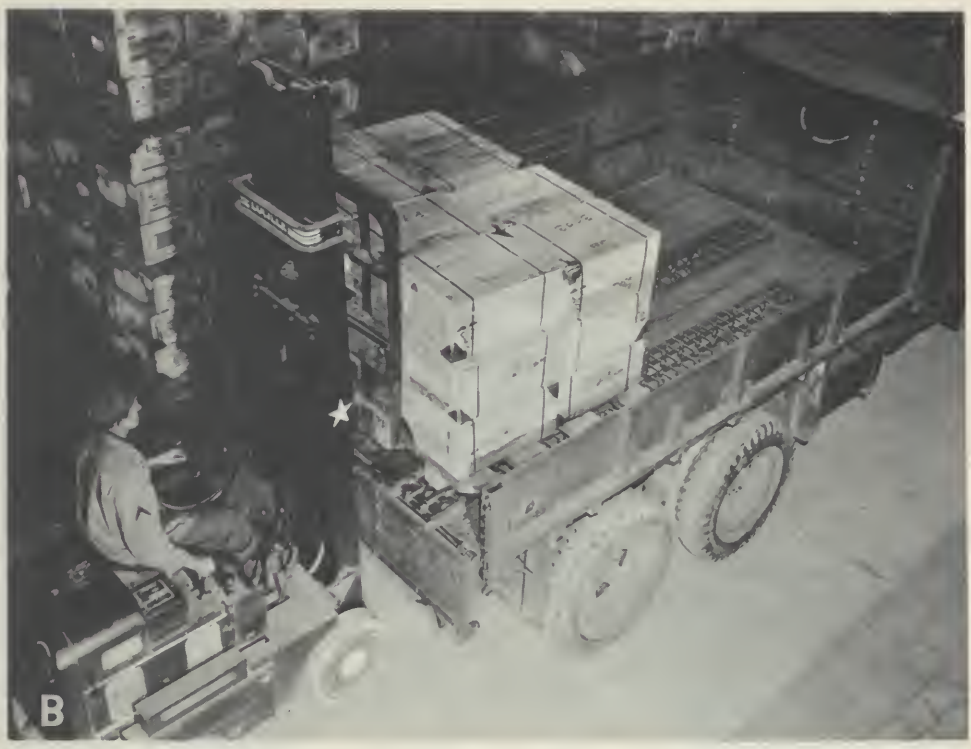

FIGURE 61.—Continued. B. Skate conveyor placed in a truck bed facilitated transfer to rail cars or unloading of other local movements of stock.

On 26 October, the 71st Medical Base Depot Company was assigned to CONAD at Dijon, where it joined in operating the depot there with the 70th which had arrived several days previously. That depot site, although it had satisfactory billeting for personnel, lacked adequate covered warehouse space. Consequently, large amounts of stock were in open storage.[47]

Later Depot Operations

As of 1 November 1944, both CONAD and the Delta Base Section were absorbed by SOLOC. The original staff of this group was drawn from the Communications Zone, NATOUSA, organization, including its surgeon, Colonel Shook. Indeed, the personnel shifts were so extensive that Communications Zone, MTOUSA (as it was formally known after 1 November 1944), went out of existence in less than a month. Its functions, including medical supply, were resumed by the theater medical section. In southern France, meanwhile,

[47] Narrative Summary, 71st Medical Base Depot Company, November 1944.

FIGURE 62.—Beach medical supply dump in southern France.

in a radical departure from earlier policy, a Medical Administrative Corps officer, Lt. Col. Allen Pappas, became medical supply officer of SOLOC.

At first, both the Delta Base Section and CONAD were supplied by Communications Zone, NATOUSA, but all supplies for CONAD passed through the Delta Base Section. They were often transferred by DUKW's (amphibious trucks, 2½-ton cargo) from ships directly to waiting freight cars, bound for forward areas without ever entering the Delta Base Depot. Receipts at the depot were very small for the first 2 months. In fact, adequate stock levels could not be achieved in either base section because ship arrivals were uncertain. Also, because the Marseille port was only partially restored, unloading was relatively slow, and transportation from port to depot was tightly scheduled. In spite of this, the 231st Medical Composite Battalion managed to fill 60 percent of the requisitions received from the Seventh U.S. Army, the French Army, CONAD, and Delta Base units. No serious shortage developed within Delta Base medical units, fortunately, because they had arrived in France with a 90-day supply. Stocks up to the authorized levels were finally on hand in the Delta Base Depot by mid-November. During the preceding 3 months, the 231st had received 3,329 tons and issued 1,894.

Map 8.—Seventh U.S. Army depots in southern France, 16–29 August 1944.

At this point in the war in southern France, stress on conservation was growing. Inducements were offered for return of salvage to depots, and emphasis was placed on repair. For some time, CONAD was without medical repair facilities of its own and was forced to farm out work to other military units in its area, but many items had to be returned to the 231st Medical Composite Battalion in Marseille.

Packaging of supplies received by the 231st was generally excellent, and breakage was minimal. In November, blankets were scarce and the shortage of certain immunizing biologicals was a cause for concern. By January 1945, the general stock picture was very good, with steady improvement in item balance and with no items in critically short supply.

Efforts made by the depot to institute modern warehouse and stock-handling practices were completely successful by March 1945, resulting in a com-

Map 9.—Seventh U.S. Army depots, 5–19 September 1944.

mendation from G–4, Headquarters, Delta Base Section, as well as Army Service Forces representatives from Washington. During April, a substantial increase in tonnage received brought considerable pressure to bear upon the storage section of the depot. A special pallet-building crew was employed to avoid a growing backpile of stock. From this experience, a unique inclined plane, skate conveyor, receiving platform was devised which permitted simultaneous receipt, sorting, palletizing, and delivery of boxes to bay locations for immediate forklift stacking. Thus, sporadic receipts of large quantities of operating supplies no longer disrupted normal operations.[48]

Compared to previous base section operations, Delta Base Section operations were extremely smooth. This was due primarily to the confidence and experience with which the headquarters, staff section, units, and individuals performed their tasks.

In December 1944, the depot opened a large pharmacy to prepare bulk quantities of 31 standard stock preparations—such as tincture of green soap, cough mixtures, and ointments—for issue to small unit dispensaries of the area, thereby relieving overburdened hospital pharmacies of this considerable workload. During the first 6 months of operation, the depot pharmacy issued more than 13,000 units of these preparations.[49]

NORTH APENNINES OPERATION

By the middle of August 1944, when the swift thrust into southern France was being launched, the Allied armies in Italy were slowed to a halt on the south bank of the Arno River and along the Metáuro River on the Adriatic. Both the Fifth U.S. Army and the British Eighth Army had outrun their supplies.

When it became apparent toward the middle of November 1944 that a hoped-for breakthrough into the Po Valley would not materialize and that Fifth U.S. Army operations for some time would be limited to patrol actions, the Army dug in for the winter.[50] The next few months were used to regroup, reequip, and bring the Armies up to strength for the final drive.

The 12th Medical Depot Company at this time attempted to adapt local civilian help to its operations to offset the reduction in strength from 166 to 136 in the reorganization under the new TOE. This proved unsatisfactory because, with each move, a new group of civilian workers had to be hired and trained. In late 1944, some relief was provided by the attachment of a company of Italian service troops which remained with the depot as it moved.

Another remarkable feature of TOE 8–667 was the inclusion of dental teams, which were described by one depot commander as so much "dead wood" because of their chronic absence on detached service. A further analysis of TOE showed that, after discounting these—and allowing for personnel as-

[48] See footnote 46(1), p. 244.
[49] See footnote 46(1), p. 244.
[50] See footnote 36, p. 232.

signed to the two storage and issue platoons operating remote from depot headquarters, to the optical team, to maintenance duty, and to Headquarters overhead—only 19 enlisted men remained at the base element to procure, store, and issue supplies and equipment, which usually amounted to an issue workload of 5 tons daily.

On this aspect of depot operations, the commanding officer of the 12th Medical Depot Company, Major Wilson, commented as follows:[51]

> It is understood that the present table was inaugurated in order to conserve manpower. It does just that, but to the detriment of efficiency in an organization in which efficiency should be foremost.
>
> It is neither practical nor possible to train civilians speaking only a foreign language to fill requisitions nor to properly warehouse supplies within such a short period of time as must be done in order for them to be of value to a field medical depot. An organization of this type may mean a matter of life and death to a soldier in the front lines. Also, it is suggested by War Department assignment that a Medical Depot Company be employed for each 75,000 troops. In reality this depot is servicing three times that number.

Changes in Theater Supply Organization

During the lull in fighting in the winter of 1944–45, theater medical supply responsibilities were being assumed by the Mediterranean theater surgeon's office. On 20 November 1944, a reorganization occurred in which the Communications Zone of the Mediterranean theater was dissolved and its responsibility in southern France was passed to SOLOC, which in turn became a subordinate command of the European theater. In this move, Colonel Shook, appointed SOLOC Surgeon, took most of his staff with him, thus causing a severe personnel problem in the Mediterranean theater. This deficiency at one point placed in jeopardy the timely submission of the theater medical supply requisition to the United States and of the supply consumption report until some relief was forthcoming.

Studies were undertaken to fix order times and shipping times for a more accurate theater requisitioning objective. Material status report items were found to have an order and shipping time of 45 days while other items took about 150 days. Further studies involving costs of transportation, storage, and issue of medical supplies were also undertaken.[52]

The role of the Peninsular Base Section as the intermediary in the chain of supply between the Fifth U.S. Army and the Mediterranean theater was being circumvented during this winter period. On several occasions, the Fifth U.S. Army went directly to the Mediterranean theater for supplies; in one instance, this resulted in a duplication when the 12th Medical Depot Company requisitioned on the depot at Leghorn at the same time the latter was acting on a cable request from the theater to satisfy the same requirement.

During the winter, the back-order system was improved within Fifth U.S. Army medical depot operations and with the Peninsular Base Section

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[51] See footnotes 4(1), p. 205; and 38(1), p. 235.

[52] (1) Annual Report, Surgeon, MTOUSA, 1944. (2) See footnote 41(2), p. 240.

depot. Previously, back-orders were held until many became invalid before they could be filled, and the volume became so great that all were ultimately canceled. After 60 days elapsed, back-orders were canceled to prevent such accumulations and, at the same time, to realize a more efficient reorder process. [53]

Changes in North African Operations

The Mediterranean Base Section transferred its headquarters from Oran to Casablanca in November 1944. In addition to its normal mission, the 56th Station Hospital became a depot in the Atlantic Base Section on movement of the 60th Medical Base Depot Company to the Peninsular Base Section from Oran. The 56th Station Hospital received 100 tons of supplies from Oran, plus subsequent shipments diverted from their original Mediterranean Base Section destination.

Previously, as operations contracted in North Africa, about 1,000 tons of medical stock were transferred to the Mediterranean Base Section, from which point they were redistributed to southern France, Italy, the Zone of Interior, and to Allied and cobelligerent forces. Eventually, however, the center of gravity for supply in North Africa moved westward from Oran to Casablanca, owing to the concentration of U.S. forces, mostly Air Corps, in that area. Thus, by 10 December 1944, medical supply operations in the Eastern, Mediterranean, and Atlantic Base Sections, once a substantial part of a vast and unprecedented logistical machine, were relegated to the 57th Station Hospital in the Eastern Base Section area, to the 54th Station Hospital in the Mediterranean Base Section area, and to the 56th Station Hospital in the Atlantic Base Section area as an additional responsibility.[54]

Other Theater Changes

Peninsular Base Section headquarters moved from Naples to Leghorn on 25 November 1944, where it joined its advance headquarters section. With this move, the base section medical supply officer and his staff were permanently located in Leghorn while medical supply activities in Naples became the part-time responsibility of one officer. Stocks in Leghorn and Naples were fairly equally divided for a time, but the rapid increase at Leghorn was eventually matched by a similar decrease in Naples. A large portion of stocks on hand in Naples, however, was theater excess concentrated there as a result of shipments from the Mediterranean and Island Base Sections. The task of balancing stocks between Naples and Leghorn presented some extremely knotty problems. Meanwhile, emphasis was placed on the buildup of balanced stocks at Leghorn and avoiding the accumulation of any excess there.

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[53] See footnote 4(1), p. 205.

[54] (1) Annual Report, 56th Station Hospital, 1944. (2) Annual Report, 60th Medical Base Depot Company, 1944. (3) Annual Report, 54th Station Hospital, 1944. (4) Annual Report, 57th Station Hospital, 1944.

Inspection of hospital supply activities in January 1945 by the medical supply officer of the Peninsular Base Section revealed that, after 2 years of virtually unrestricted activity, many glaring deficiencies existed in stock accounting, storage, requisitioning, and housekeeping. Accordingly, a series of medical supply conferences were held which served to revise the standards and to improve operations.[55]

The two Northern Base Section depots operated on Corsica since February 1944, by an advance section of the 7th Medical Depot Company, were consolidated in October 1944 into one depot operated by a detachment of the 684th Quartermaster Base Depot Company. By the end of March 1945, and before deactivation of Headquarters, Northern Base Section, on 25 May, medical supplies there had been reduced to only 75 tons; by 6 April 1945, the depot had closed and personnel departed for Italy. Units remaining in Corsica were supplied by the 40th Station Hospital, which carried a 120-day supply for 1,000 beds.[56]

In January 1945, a medical supply conference was held at Fifth U.S. Army headquarters. This conference improved inventory reporting, and clarified requirements determination and maintenance of stock levels, in addition to establishing policy for continuous review of stocks for determination and disposition of excesses.[57]

The increase in tonnage at the Leghorn depot, which had accelerated during November and December, abruptly halted in January 1945, prompted by an anticipated German offensive which had the port of Leghorn as its objective. Previously scheduled shipments were diverted to Naples and, in anticipation of attack, redistribution of large quantities of stock to the 12th Medical Depot Company at Florence was planned. The Fifth U.S. Army supply level was increased from 10 to 20 days, with tonnages jumping from 150 to 205 tons. However, plans and preparations were never brought into action because the German offensive did not materialize. Normal operations were resumed at Leghorn, and during February and March 1945, tonnage rose to almost 4,500 tons.[58]

Meanwhile, the 4th Medical Depot Company was redesignated and reorganized as the 232d Medical Composite Battalion. The 72d Base Depot Company assisted it in the storage and issue of supplies in the Naples area, while the 73d Medical Base Depot Company operated the Leghorn depot from October through December 1944.

The 232d was again reorganized into a medical service battalion of the same number, which improved its authorized strength and maintenance ele-

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[55] Hansen, William L.: [Peninsular] Base Section Medical Supply Activities, 10 Aug. 1945. [Official record.]

[56] Annual Report, Northern Base Section. 1944 and 1945.

[57] Report of Supply Conference at Headquarters, Fifth U.S. Army, 2–3 January 1945, dated 4 Jan. 1945.

[58] See footnote 55, above.

ment. The 60th and 80th Medical Base Depot Companies, and the 684th Quartermaster Base Depot Company, all attached or assigned to the battalion, successively operated the depot at Leghorn which served seven station hospitals, five general hospitals, the 12th Medical Depot Company, various port battalions, Quartermaster detachments, Air Force units, and a variety of other elements in the area.

The Leghorn depot became the main medical supply point for the theater during February 1945, and maintained theater reserves for the Northern and Mediterranean Base Sections, and the Adriatic Depot. The fifth echelon maintenance shop, spare parts, stock of teeth, and optical repair shop had been previously transferred from Naples to Leghorn during January.[59]

PO VALLEY CAMPAIGN

Preparations for the final drive into the Po Valley were thorough and extensive. The Fifth U.S. Army was brought to full strength—almost 270,000 on 1 April 1945, as compared to the 170,000, 6 months earlier. However, resources available to the Fifth U.S. Army Surgeon were increased by only one 400-bed evacuation hospital over the inadequate number of facilities for the lesser strength supported in the North Apennines Campaign. Additional medical battalions, ambulance companies, or supply units were not added. Hospital bed capacity was less than enough to keep pace with the increase in troop strength. Close general hospital support of the Army medical facilities was necessary to absorb the overflow.[60]

Moving from their respective locations in Filigare and Lucca as the campaign advanced, the two forward storage and issue platoons of the 12th Medical Depot Company established depots at Porretta and Bologna. Each left behind a small detachment in its former location to operate dumps which supported units remaining in the vicinity.

By 30 April 1945, the 2d Storage and Issue Platoon had progressed to Verona by way of Mirandola, and shortly thereafter, the depot headquarters, maintenance section, and 1st Storage Issue Platoon moved from Florence to Modena, while the 3d Storage and Issue Platoon remained at Bologna (map 10). The headquarters section had barely completed setting up when hostilities in Italy ceased on 2 May 1945.[61]

During the final offensive, heavy casualties as well as nonavailability of trucks and ambulances and subsequent delays caused a great deal of confusion. The confusion was in no way lessened by the fact that medical units, following on the heels of the retreating enemy, often found themselves operating behind the German lines.

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[59] See footnote 42(2), p. 242.

[60] Annual Report, Surgeon, Fifth U.S. Army, 1945.

[61] Monograph, Lt. Col. George P. Wilson, MSC, dated 13 Aug. 1945, subject: Fifth Army Medical Depot Activities.

Map 10.—Medical supply depots in northern Italy, 15 October 1944–1 May 1945.

SOME SUPPLY ACTIVITIES IN REVIEW

Depot Operations

During the Italian campaign, the 12th Medical Depot Company performed herculean tasks of operation and movement (fig. 63). It received a total of 2,524 tons of supplies and issued 2,402 tons. Nonrepairable and surplus equipment and supplies were moved to the rear. New organizations entering combat for the first time drew heavily on expendable supplies until they

FIGURE 63.—Medics of the 10th Mountain Division pull sled with litter and bundle of medical supplies up a steep incline of the Apennines.

learned through experience that it was neither wise nor expedient to be burdened with excessive quantities.[62]

Changes in depot locations were necessarily governed by changes in the tactical situation. The pattern of depot movement normally put an advance detail at the new location to make preparations for receiving the balance of the depot. When time was not of the essence, the issue room and stock ac-

[62] See footnote 61, p. 253.

FIGURE 64.—Repair of X-ray generators, being performed by the improvised medical maintenance shop at the depot in Oran, was a perpetual requirement.

counting section were the last to move. Usually convoys of original-package stock were moved first. This gave the issue section time in which to pack loose stock. To facilitate these moves, men of the issue section premarked cases for the various classes with the medical catalog class number to identify the contents, thus permitting requisitions to be filled immediately upon arrival.

In effecting a move, experience proved that one convoy a day was the most practical as it permitted unloading at the new location before the next convoy arrived, and permitted men at the old location to strike tentage while preparing the next convoy. Fortunately, all moves were possible in daylight which helped to avoid undue confusion.[63]

Medical Maintenance

During the first 30 days of operations in North Africa, the need for a medical maintenance program was quite evident (fig. 64). Almost all field

[63] See footnote 61, p. 253.

X-ray equipment, which was irreplaceable, arrived with broken leaded glass screens. Even such minor items as wicks in the kerosene refrigerators burned out, and glass tubing on steam sterilizers and plastic knobs on the sterilizers arrived broken. With no maintenance program, even the simplest parts were not available for replacement. It is true that many replacement parts were in the medical supply catalog, but there was only a token number, and they were primarily of a type such as otoscope and ophthalmoscope light bulbs normally consumed in the use of the basic item.

The ingenuity of members of various medical units was relied upon to reconcile numerous maintenance problems. Many "Rube Goldberg" devices and modifications worked extremely well and were so practical that eventually a theater program was established wherein all such creations and modifications were reduced to drawings, gathered together, published, and distributed within the theater for the benefit of all units (fig. 65 A and B).

The parts problem gathered such momentum that, within 60 days from D-day, a recommendation was forwarded from the Medical Section, Mediterranean Base Section, that, as an interim measure, manufacturers be required to pack with each item they supplied, a 6-month supply of those component parts which they considered necessary for frequent replacement. This was never fully implemented, except for the Coleman stove. Parts provisioning of this type later became a feature in the Medical Department's maintenance program.

The first requisition prepared in the Mediterranean Base Section included many nonstandard items, over half of which were uncataloged repair parts. In the absence of necessary catalogs and technical skills, identification of the wide variety of parts for the numerous manufacturers and types of equipment in use was, in most instances, nothing more than guesswork. Considerable effort was later expended over a 6-month period by the Medical Section, Headquarters, SOS, to establish a firmer basis of requirements, but the size and complexity of the task severely limited any broad approach to the subject. Meanwhile, item-for-item exchange and cannibalization caused large quantities of unserviceable items to accumulate in depots, and the irreducible minimum resulting from cannibalization was frequently reached. It was in this climate that a semblance of medical maintenance activitiy developed in medical depots from a part-time operation of expediency into activities in base depots which could be called shops.

With the capitulation of Italian and German forces in North Africa, maintenance shop activity was accelerated. Many skilled and eager electricians, metal workers, and craftsmen were found among the prisoners. When the invasion of southern France was launched, this type of augmented maintenance shop activity in base depots was at the peak of its development. The medical depot at Marseille, operated by the 231st Medical Composite Battalion, boasted a very active and capable shop supervised by a maintenance trained officer. This, however, was the exception rather than the rule.

FIGURE 65.—Austerity fathered improvisation, and publications distributed to all medical units in the theater carried descriptions of the more practical devices, such as: A. Wash sink made from an oildrum. B. Home-made lamp, used in searching the abdomen for a shell fragment.

In spite of these developments, maintenance of medical equipment in general and of spare parts in particular remained a painful problem throughout the theater's active period.[64]

Local Procurement

Early in the Tunisia Campaign, it was directed that the procurement of supplies, services, and facilities interfere as little as possible with the local economic situation.

Practically all drugs and chemicals which had been imported into North Africa before the war began had been consumed at the time of the Allied invasion. However, small amounts of alcohol and mercury were found and subsequently procured for use of U.S. forces.

An important service was performed by a small metal-plating shop which had sufficient stocks of basic materials to produce a plated finish superior to the poorly plated knives, forks, and spoons of U.S. issue. A program was instituted wherein all medical units in the Oran area turned in unserviceable utensils for an item-for-item exchange at the depot. This was later expanded to some surgical instruments when total production was increased to about 300 pieces per week. What promised to become a thorny problem was partially solved by this unexpectedly available local service.

In all of the Mediterranean campaigns, the possibilities of local procurement were examined and exploited whenever possible. In Sicily, all that could be located were 7½ pairs of spectacle lenses and some lens surface-grinding equipment. This, of course, had no practical application to the U.S. optical activities. However, 20,000 liters of 95 percent proof ethyl alcohol at 10 cents a liter was found as well as usable quantities of hydrochloric, sulfuric, and picric acids. Also in Sicily, local laboratory services were contracted for during February 1944, with an expenditure totaling $2,796.35.

A firm in Rome was located, capable of producing a satisfactory artificial eye for $2.50, which was one-third the prevailing price for this item in the United States. Artificial eyes were thus procured at a rate of 24 per week. A source of medicinal oxygen was also located in Italy, and some 350,000 gallons were procured.[65]

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[64] (1) Semiannual Report, 231st Medical Composite Battalion, 1 January–30 June 1945. (2) See footnote 52(1), p. 250.

[65] (1) Administrative Memorandum No. 7, Allied Force Headquarters, 15 Oct. 1942. (2) See footnote 52(1), p. 250. (3) Letter, Commanding Officer, 6th General Hospital, to Surgeon, Peninsular Base Section, 1 Aug. 1944, subject: Eye Prostheses. (4) Letter, 1st Lt. Peter F. Heinrich, SnC, 7th Medical Supply Depot, to Surgeon, SOS, NATOUSA, 24 Oct. 1943, subject: Report of Findings Relative to Purchase of Optical Supplies in Palermo, Sicily. (5) Letter, Commanding Officer, Island Base Section and 10th Port, to Commanding General, SOS, NATOUSA, 5 Mar. 1944, subject: Monthly Report of Local Purchases for February 1944. (6) Letter, Commanding Officer, Island Base Section, to Commanding General, SOS, NATOUSA, 27 Oct. 1943, subject: Local Purchases.

SUPPORT OF CIVILIAN POPULATIONS

Role of Allied Military Government

The management and support by Allied Forces of civilians in occupied areas of the Mediterranean theater was initially the task of AMGOT (Allied Military Government of Occupied Territory). Initial medical supply planning took place in preparation for the Sicily Campaign when the British planning unit provided for a director of public health, responsible for making available drugs, dressings, pharmacies, and hospitals.[66]

Before this, the use of U.S. medical supplies to treat civilians was accomplished for either political or other purposes which had an immediate effect on the capability of the United States to prosecute the war. In Oran, for example, French civilian health authorities established clinics for the treatment of venereal diseases. These clinics were furnished U.S. medical supply support.

Supply requirements for AMGOT necessarily took lower priority than those for purely military purposes. Beginning with the Sicilian campaign, however, AMGOT supplies were allotted space which was included in the task force quotas. Because the Combined Chiefs of Staff had not yet approved the items to be made available to AMGOT, U.S. medical supplies for civilian purposes in Sicily were limited to what could be spared by combat and occupation forces.

In planning for Sicily, AMGOT, in the British plan, was responsible for estimating and providing medical stores for the civilian population. Arrangements were to be made to issue these supplies through public health centers, hospitals, drugstores, or direct issue as necessary. Units were made up of biological units, basic medical units, and Engineer and Quartermaster Corps sanitary supplies designed for specific purposes.

The Italian medical depot captured in Caltanissetta, Sicily, used as a U.S. Army medical depot and later turned over to AMGOT, was the first supplying depot to AMGOT regions I (Sicily) and II (toe-and-heel provinces of Italy). Later, AFHQ arranged to stockpile Civil Affairs Division units in regions I and II with a buildup covering 9 months beginning September 1943. Over 1,100 Civil Affairs Division units of various types were the estimated requirements to service the population of 8,862,000 in regions I and II for 90 days (fig. 66).

Responsibility for the distribution and storage of civilian medical supplies was originally based on a coordinated effort between the Medical Section, NATOUSA, and the Military Government Section, AFHQ. This responsibility later was given entirely to the Medical Section, NATOUSA, to

[66] For a detailed study of civil affairs and public health in Italy, see Medical Department, U.S. Army. Preventive Medicine in World War II. Volume VIII. Civil Affairs and Military Government. Public Health Activities. [In preparation.]

FIGURE 66.—Italian personnel at Medical Depot 3L50 sort surplus medical supplies, most of which were eventually acquired by the Italian Government.

improve control. Within the medical section, this responsibility fell to the medical supply officer.[67]

Medical Supply Branch, AMGOT

In November 1943, a medical supply branch was formally incorporated into the newly reorganized Public Health Subcommission of the Allied Control Commission, AMGOT, which ultimately relieved the 15th Army Group of its civilian medical supply functions. Col. Martin E. Griffin, MC, Chief, Medical Supply Depots, Allied Control Commission, was appointed its chief medical supply officer on 1 January 1944.[68]

Region III military government headquarters set up a central medical supply depot in a Red Cross warehouse in Naples in November 1943, and in January 1944, the Allied Control Commission took it over. Supplies from the United Kingdom, United States, or North Africa were stored and distributed to all regions of Italy. The NATOUSA policy for distributing supplies provided that, except for an initial 30-day period, medical supplies should not be issued automatically on a Civil Affairs Division unit basis to civilians in a conquered area. Supplies for the initial 30-day period consisted of a balanced stock of lifesaving supplies, warehoused in strategic supply areas, and issued on requisition to meet actual relief needs. These supplies could be replaced from theater stocks as required. After the initial period, medical supplies furnished to civilians in an occupied country were either medical supplies for restoration of health, or lifesaving supplies. Supplies were thus requisitioned by regional public health officers on the medical depot by line item rather than by Civil Affairs Division units.

Augmented by additional personnel, the central medical supply depot operated, under detailed accounting procedures, a price list, together with procurement, storage, and issue instructions. Supplies were received from North Africa, the United States, and the United Kingdom, and distributed to the warehouses established in each region under the supervision of the regional public health officer. All supplies ceased to be the property of the Allied Control Commission when they were sold and shipped to the Italian agency, Medici Provenciali, established to distribute medical supplies to the population of each province.[69]

In addition to computing requirements, requisitioning, and accounting for supplies, together with their sale, distribution, and control, regional public health officers in Italy also assisted reputable manufacturers in resuming production of essential drugs and biologicals. Free issues from Italian warehouses were permitted only in emergencies. Fair prices to hospitals and

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[67] See footnote 4(1), p. 240.

[68] See footnote 4(1), p. 240.

[69] (1) See footnote 4(1), p. 240. (2) Memorandum, Surgeon, NATOUSA, to Military Government Section, AFHQ, 17 Dec. 1943, subject: Requirements of Medical Supplies for AMG.

clinics, doctors and midwives, pharmacies and other retail channels were established, controlled, and issued in that priority.[70]

Growth of Medical Supply Support

By March 1944, the Naples depot possessed complete facilities. Regions I to VI, inclusive, had supply depots in operation and a subdepot was established in Bari concurrent with the move of region II headquarters to that city. Except for a few items which had been covered by special requisitions, there were adequate stocks of medical supplies in occupied Italy for civilian medical care.

From March to July 1944, the medical supply branch of the control commission operated depots at Reggio, Bari, and Rome for variable periods. Personnel was shifted from depot to depot, as the occasion demanded, to set up distribution in new areas. With the advent of cobelligerent status accorded the Italian Government, distribution of medical supplies in region II was turned over to Italian civilian organizations, such as wholesale drug houses. This arrangement proved highly satisfactory and helped to overcome the existing problem of shortages of military personnel.

The general policy in administering civilian medical supply support in occupied areas of the Mediterranean theater, as developed from experience by the Medical Supply Branch, provided that items and quantities must be the minimums essential for the area concerned, and luxury items were not to be supplied. Medical supplies and equipment in an area at the time of occupation were to be preserved with the cooperation of combat commanders. Drugs for the prevention and cure of veneral diseases and preventive biologicals for other communicable diseases were to be emphasized, and public health officers would be familiarized with the types of medical items available for the care of civilian populations. The supply organization, as well as procedures for supply, procurement, accounting, and control, was to be established as early as possible with maximum use of existing normal distribution channels within the civilian community. Finally, it was emphasized that issues would be on an item basis rather than a Civil Affairs Division unit basis.[71]

Use of Local Resources

Civilian supplies requisitioned for the period July to December 1944 did not arrive in the theater as scheduled, chiefly because of transportation problems. Insufficient transportation also aggravated the supply of northern regions from the Naples depot. However, during this period, as more and more local supplies were uncovered, it appeared that the theater stockpile would suffice for a much longer period than originally anticipated.

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[70] See footnote 4(1), p. 240.
[71] See footnote 4(1), p. 240.

In 1944, the G–5 section was established in AFHQ to carry out the Supreme Allied Commander's responsibilities in civil affairs. Ultimately, the section assumed control of civilian supplies in the theater, and the central Civilian Medical Depot, Mediterranean theater, was established in lieu of the Central Medical Depot, and dealt directly with AFHQ.

During 25–28 September 1944, approximately 600 tons of supplies were unloaded at Naples, and many shortages of long standing were thereby relieved. On 1 November 1944, responsibility for distributing medical supplies in northern Italy, except Army areas under AMGOT control, passed to the Italian Government.

Beginning with the end of hostilities in Italy on 2 May 1945, AFHQ directed that military responsibility for civilian medical supplies in Italy was to be terminated as rapidly as possible. Effective 15 August 1945, the Italian Government accepted all shipments of medical supplies at boatside and assumed responsibility for their distribution throughout Italy.[72]

REDEPLOYMENT

In the late spring of 1944, plans were being developed by SOS, NATOUSA, for the redeployment of U.S. troops and supplies when hostilities ceased. As a corollary, the Atlantic and Eastern Base Sections closed in November 1944, and the Mediterranean Base Section, once the supply giant of the theater, was reduced to a small role in North Africa. All medical materiel coming into the theater was received at either Leghorn or Naples, with the Peninsular Base Section having the responsibility for intrabase distribution. Eventually, the bulk of the theater reserves was also transferred to the latter base section, which assumed all medical supply functions of the Mediterranean theater on 1 October 1945. A month later, the Medical Section of the Mediterranean theater was also discontinued, leaving the Peninsular Base Section responsible for medical support of all U.S. forces remaining in the theater.[73]

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[72] (1) See footnote 4(1), p. 240. (2) Letter, Surgeon, NATOUSA, to Col. George M. Powell, MC, SGO, 30 Dec. 1944. (3) Letter, Col. M. E. Griffin, MC, to Lt. Col. Ryle A. Radke, MC, Surgeon's Office, NATOUSA, 14 Oct. 1944.

[73] Final Report, Medical Supply Officer, Office of the Surgeon, MTOUSA, 30 Sept. 1945.

CHAPTER IX

Europe: Preinvasion Buildup in the United Kingdom

PRELUDE

Beginning in May 1941, the U.S. Military Mission to London, called the Special Observer Group, had been quietly and carefully planning the disposition in the United Kingdom of a tentative U.S. troop strength of 87,000 men and their accompanying equipment.

Following Pearl Harbor, the observer group rapidly began to put their formerly secret plans into operation. The projected troop strength rose to 105,000 men with the plan, MAGNET, which called for a much larger U.S. force in northern Ireland to defend against Axis attack. Early in January 1942, U.S. Army Forces in the British Isles replaced the Special Observer Group, thus establishing the first U.S. Army command in the United Kingdom. Shortly thereafter on 26 January, the first contingent of 4,000 U.S. troops debarked at Belfast, northern Ireland. The buildup of a U.S. Air Force in the British Isles began in late February with the establishment of a bomber command (VIII Bomber Command); by mid-June, plans were made for the direct participation of U.S. air units in the war against Germany.

To supply the planned assault, Headquarters, Services of Supply, under the command of Maj. Gen. John C. H. Lee, was activated on 24 May 1942.[1]

MEDICAL SUPPLY

Early Organization of the Supply Division

The Finance and Supply Division (later the Supply Division), Chief Surgeon's Office, ETOUSA (European Theater of Operations, U.S. Army), was established by verbal order of the Chief Surgeon, Col. (later Maj. Gen.) Paul R. Hawley, MC, on 13 June 1942 at 9 North Audley St., London. Lt. Col. (later Col.) Earle G. G. Standlee, MC, was designated chief and purchasing and contracting officer.

Shortly after the Finance and Supply Division was created, it was moved to Ben Hall Farm at Cheltenham, Gloucestershire, about 100 miles west of London, where it shared facilities with several other divisions of the Chief

[1] For further details on the background and operations of the Special Observer Group, see: (1) Ruppenthal, Roland G.: Logistical Support of the Armies. United States Army in World War II. The European Theater of Operations. Washington: U.S. Government Printing Office, 1953, vol. I, pp. 13–51. (2) Potter, Hubert E.: The Medical Department: Medical Service in the European Theater of Operations. United States Army in World War II. Ch. I. [In preparation.]

Surgeon's Office and the other technical services of the Army. Facilities consisted of a group of temporary camouflaged buildings that had been constructed originally to house parts of the British Ministry of War in the event of invasion or the destruction of the London headquarters. The move to Cheltenham hindered operations of the division because most of its transactions with the British War Office were conducted in London; hence, it became necessary to appoint a London liaison officer. The fact that a Chemical Warfare Service officer served as the liaison officer until a Medical Department officer became available was an early symptom of medical supply's basic weakness of inadequate personnel. Originally, the Supply Division consisted of two Medical Corps officers and one enlisted man, but it was later augmented by a few additional officers, of whom several were untrained in medical supply work.

Within 10 months, there was a succession of four division chiefs. After Colonel Standlee was relieved to go to North Africa in the latter part of August 1942, Lt. Col. (later Col.) Clarence E. Higbee, SnC, was chief for a short period before being replaced by Lt. Col. Howard Hogan, MC. In July 1943, Colonel Hogan was replaced by Col. Walter L. Perry, MC. These frequent changes were not conducive to increasing effectiveness.

Early Functions and Purposes

The first task of the Finance and Supply Division was to compute the requirements for Operation BOLERO, the initial plan for the invasion of Europe; this involved considering material available from British and U.S. sources, and acquiring the necessary depot space for storage and issue of medical supplies and equipment. Plans for medical care under BOLERO included a requisition of supplies and equipment needed to build up the United Kingdom as a base, and acquisition of supplies and equipment required for the assault on the Continent. Accordingly, material in the form of bulk stocks (resupply) and unit assemblies to match troop lists, plus reserve stocks, began to arrive in the United Kingdom by mid-1942.[2]

Operation TORCH

The Supply Division had barely started the development of BOLERO when it was assigned the difficult task of furnishing medical supplies and equipment for Operation TORCH, the assault on North Africa. This assignment began in August 1942 and lasted until early 1943, when the Zone of Interior absorbed full resupply responsibility. During this period, all combat units, including medical units, embarking for the United Kingdom were furnished basic TOE (table of organization and equipment) equipment and a 15-day initial supply of medical items.

Medical units equipped to meet the sailing schedules for the convoys moving from England to Africa consisted of four 250-bed station hospitals, one

[2] History of Medical Service, SOS, ETOUSA, From Inception to 31 December 1943. [Official record.]

400-bed surgical hospital, three 750-bed evacuation hospitals, one 750-bed station hospital, two 1,000-bed general hospitals, one medical depot company, and 22 medical maintenance units for resupply. To insure accomplishment of this task, the Chief Surgeon established a special Medical Planning Group, consisting of Lt. Col. (later Brig. Gen.) James B. Mason, MC, Lt. Col. (later Col.) Clark B. Meador, MC, and Lt. Col. John Douglas, ADMS (British).

In fulfilling TORCH supply requirements, it was necessary to strip many units, including operating hospitals, of major items of medical equipment and vehicles. In addition, 30 incomplete medical assemblies in depot stocks were disassembled to build the hospitals required to support TORCH. This task was complicated by the fact that the personnel of the only medical depot company (the 1st) in the United Kingdom were dispersed to five different locations; also, the assembly of materiel for TORCH requirements had to be accomplished concurrently with attempts to provide newly arrived hospitals and other medical units with their basic operating equipment. Inexperienced personnel and a scarcity of stock and packing materials magnified supply problems beyond their normal dimensions, and preparations for TORCH were barely completed as the task force embarked.[3]

Procurement in the European Theater, 1942–43

Procurement of medical materiel from the British was a burden on the economy of Great Britain, whose industrial sections were severely damaged after 3 years of war. The available labor force was predominately older men and women, who, in addition to their jobs in industry, were engaged during off-duty hours in civilian defense activities as ambulance drivers, wardens, policemen, and firemen. Industry was necessarily closely controlled by the government, with the Ministry of Supply responsible for allocation of manufacturing facilities, manpower, and materials.

The Procurement Section, Medical Supply Division, was located in London within the office of the General Purchasing Agent, ETOUSA, which had supervisory responsibility for all procurement from British sources. While this location had some advantages, it hindered close liaison with the Requirements and Requisitions Branch in Cheltenham.

In the first year of American participation in the war, 1942, serious shortages of military supplies, including medical items, persisted in the European theater. Transatlantic shipping facilities were inadequate, and German submarines were taking a heavy toll. As a means of compensating for those serious handicaps, the British agreed to supply U.S. forces in the United Kingdom, wherever possible, through a reciprocal aid program, commonly called Reverse Lend-Lease.

The medical portion of this program was substantial and important. Through construction or use of existing buildings, the British not only made available many hospitals (fig. 67), but also supplied a predetermined list of

[3] See footnote 2, p. 266.

FIGURE 67.—Hospital plant at North Mimms, Hertfordshire, England, where the 1st General Hospital, U.S. Army, commenced operation in January 1944.

basic housekeeping equipment, including such items as beds, bedside tables, and mess equipment. Technical medical equipment for hospitals, furnished partly by the British and partly from the United States, was to be assembled within the ETOUSA medical depot system. Requirements for medical materiel, over and above the initial establishment of fixed hospitals, were computed by the Supply Division, and an additional demand was placed on the Ministry of Supply for those items which could be furnished from British resources. Otherwise, a requisition was sent to the United States. In doubtful items, the demand was duplicated in the U.S. requisition, but was subject to cancellation if the British agreed to accept the demand. This added proviso was a manifestation of the prevailing uncertainty. Since acceptance at either source frequently required several months, prolonged confusion and duplication were common.

Problems in Procurement

Although English was the common language, it was learned gradually through experience that there were essential differences in nomenclature of like items: GI cans were "dustbins" to the British; excelsior was "wood wool"; requisitions were "indents." For almost every item of medical mate-

riel, British and American specifications were at variance. The same drugs often had different names and different unit packaging. Surgical instruments proved to be a problem as the design, weight, and balance were unfamiliar to American surgeons and frequently were unacceptable. Some items were similar enough that they could be carried under the U.S. nomenclature and catalog item number, but the majority had to be specifically identified as British. It was necessary to publish a British-American catalog of equivalents and a list of acceptable British substitutes. These publications were prepared and published by the Supply Division under the guidance of the professional consultants to the Chief Surgeon, ETOUSA.

U.S. materiel requirements often represented fantastic quantities by British standards. As an example, initial U.S. demands for dental burs were greater than the total annual British requirements for civil and military needs. Conversely, some quantities were small compared to British allowances. Furthermore, requirements fluctuated with the continual alteration of plans, which was inevitable in a buildup of BOLERO's magnitude.

In July 1942, large requirements were placed on the British, to be delivered in increments from 1 August 1942 to 1 April 1943. In September and October, further demands were made, with deliveries to be phased from December 1942 to September 1943. Each new demand injected changes into previous ones, creating much confusion. These requirements included not only supplies for hospitals and troops in the United Kingdom, but also many supplies for the North African assault.

In early 1943, the general policy provided that items requiring extensive labor in their production but a small amount of tonnage were to come from the United States, whereas items with little labor and large tonnage were to be procured in the United Kingdom. By mid-1943, U.S. production was in high gear; shipping had increased, submarine sinkings were declining, and a number of items were excess to needs in the United States; hence, lists of these items were sent to the European theater so that United Kingdom procurement could be curtailed. In several instances, it was discovered that the British were securing items from the United States under lend-lease procedures while U.S. forces in the United Kingdom were placing demands on the British for the same items.

Late in 1943, deliveries of technical medical materiel from British sources dropped off appreciably because of increased labor shortages and increasing British needs to equip their own forces for D-day. Fortunately, shipments from the United States were constantly increasing during the latter part of the year.[4]

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[4] (1) Letter, Lt. Col. Howard Hogan, MC, to Deputy Chief Surgeon, ETOUSA, 14 Jan. 1943, subject: Data for Consolidated Annual Report of the Chief Surgeon's Office, SOS, ETOUSA. (2) Circular Letter No. 30 (Supply No. 5), Office of the Chief Surgeon, Headquarters, SOS, ETOUSA, 17 Sept. 1942, subject: Medical Supplies and Services Procured Under Reciprocal Aid (Reverse Lend-Lease). (3) Circular No. 1, Headquarters, ETOUSA, 4 Jan. 1943, section II, subject: Policy to Govern the Procurement of Supplies in the United Kingdom. (4) Annual Report, Supply Division, Office of the Chief Surgeon, ETOUSA, 1943.

Approximately 75 percent of the total tonnage of medical supplies received by U.S. forces in the United Kingdom came from British sources in 1942, with only 25 percent from the United States. During 1943, almost 56 percent of total tonnage received, including program C (housekeeping) items, came from the British (table 2).

TABLE 2.—*Medical supplies for U.S. forces in the United Kingdom from British and American sources, 1942–44*

Date	From the United States	From the United Kingdom
	(*Ships tons*)	(*Ships tons*)
1942 (after 19 June)	28, 000	84, 000
1943	56, 000	71, 000
1944 (to 19 March)	40, 000	13, 000
Total	124, 000	168, 000

In retrospect, procurement of British medical materiel served a useful purpose in 1942 and 1943 when U.S. production was slowly getting underway and shipping was scarce. Moreover, it was helpful in supplying housekeeping equipment before D-day for fixed hospitals in the United Kingdom. Program C items, which were nontechnical, remained fairly stable, so that detailed specifications were relatively unimportant. Deliveries were usually made directly to hospital sites, thus avoiding depot workload; and the items were bulky, which resulted in the saving of ocean cargo space.

Because requirements and specifications changed frequently and deliveries made to depots came in all sizes of containers, production delays were frequent, and recordkeeping was difficult. Lack of personnel in the procurement section of the Supply Division also added to the problems.[5]

MEDICAL SUPPLY DEPOTS

Organization

With relatively few exceptions, U.S. depots in the United Kingdom were general depots, designated by the letter G, followed by a number, 1 to 100, and jointly occupied by more than one technical service. The commander of each general depot was a Quartermaster Corps officer, and the officer in charge of the medical section was known as the medical supply officer. Medical depots were designated by the letter M, followed by a number from 400 to 499.

Depots in the United Kingdom were located generally in existing buildings made available by the British. The medical section of Depot G–20 was

[5] (1) Cable, ETOUSA (Lec) to AGWAR, 22 Apr. 1944, subject: Medical Supplies Obtained by Medical Service as Reciprocal Aid. Program C items, also called accommodation stores, included such articles as beds, mattresses, blankets, and sheets for the hospitals, and kitchen and eating utensils, as well as furniture for the use of the hospital staffs. (2) See footnote 4(4), p. 269.

FIGURE 68.—Quartermaster Depot G–50, Taunton, Devonshire, England.

located in a brewery while Depot M–401 at Witney was located in a barnlike structure on the grounds of a blanket-weaving mill. Adaptation of the TOE depot company with a fixed allowance of officer and enlisted personnel to these depots of varying capacities presented a serious problem. The only type of unit available in the European theater for this purpose was the medical depot company, organized under TOE 8–661 of 1 April 1942, consisting of 16 officers and 227 enlisted men.

Depot Units and Operational Sites

The first medical supply installation in the United Kingdom was established in May 1942 at Belfast by a section of the 8th Medical Depot Company. In December 1942, this unit became the medical section of Depot G–10.

The first complete TOE medical supply unit in the United Kingdom was the 1st Medical Depot Company, which arrived in England on 13 July 1942. Additional depot companies did not arrive in the theater for more than a year. During the interim, the scattered medical depots in England were operated by cadres of personnel from the 1st Medical Depot Company, augmented by attached officers and enlisted men. This situation was not conducive to good morale. As promotions for officers and enlisted men were based primarily on TOE authorizations, only a few were awarded. During this period, some depots had as many as 100 officers and enlisted men in a casual status attached for duty.

During 1942, five medical sections of general depots (fig. 68) were established in England (table 3), with emphasis on dispersion because of the danger from air attacks.

TABLE 3.—*Medical depots and medical depot sections in the United Kingdom, 31 December 1943*

Depot	Location	Date established	Storage space (square feet)	
			Covered	Open
G–45	Thatcham	13 July 1942	87, 840	28, 500
G–20	Burton upon Trent	2 Aug. 1942	83, 213	35, 000
G–35	Bristol	12 Aug. 1942	171, 000	0
G–14	Liverpool	1 Sept. 1942	127, 791	15, 000
G–50	Taunton	1 Sept. 1942	110, 680	25, 000
M–400	Reading	12 Feb. 1943	25, 201	0
G–40	Barry	24 May 1943	52, 275	15, 000
G–16	Wem	27 May 1943	70, 560	15, 000
M–402	Nottingham	21 June 1943	46, 045	14, 500
G–30	London	1 July 1943	117, 692	31, 072
M–401	Witney	10 July 1943	84, 833	0
G–22	Moreton on Lugg	20 Aug. 1943	67, 200	48, 600
G–15	Boughton	5 Nov. 1943	20, 344	25, 000
G–23	Histon	5 Nov. 1943	84, 000	20, 000
M–403	Launceston	2 Dec. 1943	87, 000	0
M–410M	Moneymore, N. Ireland	23 Dec. 1943 [1]	61, 600	15, 000

[1] Redesignated M–410M on 23 December 1943, originally G–10–1 established on 18 May 1942.

SOURCES: (1) Annual Report, Supply Division, Chief Surgeon's Office, ETOUSA, 1943. (2) Annual Report, Medical Section, General Depot G–35, 1944.

Immediately following their activation, the sections were saddled with the mounting of Operation TORCH. Depot G–45 at Thatcham had the major responsibility, functioning as the primary assembly and distribution depot for medical supplies. The other four depots assisted by building unit assemblies and 22 medical maintenance units for Operation TORCH. The workload for the issue of 15 days' accompanying supplies to each unit was distributed among the five depots. Despite the extremely heavy workload, the task was completed in the allotted time.

Until the summer of 1943, the North African theater, as the more active combat theater, had a priority on shipments from the United States. However, establishment of depots in the United Kingdom (map 11) in preparation for Operation OVERLOAD continued. During 1943, 10 new depots were established and their medical sections were set up by five new medical depot companies—the 6th, 11th, 13th, 15th, and 16th (table 3). The 1st Medical Depot Company, which had borne the brunt of operating the depots, was gradually relieved by the newly arrived units, and was withdrawn early in 1944 to prepare for its role in support of the First U.S. Army.

With the exception of Depot M–400 at Reading, which was a repair and spare parts depot, and Depot G–45 at Thatcham, which had an assembly mission, all depots during 1942 and 1943 were responsible for distributing supplies to units in assigned geographic areas. Many had, in addition, other missions, such as receiving shipments directly from ports of entry and from

MAP 11.—Medical supply depots in the United Kingdom, December 1943.

British procurement, manufacturing unit assemblies, and storing reserve stocks.[6]

Depot Operations

Inadequacy of storage space, inexperienced personnel, and the general lack of knowledge of medical supply operations in the early days in the United Kingdom can be illustrated by describing the operations of the medical section of Depot G–35 at Bristol. The depot was established on 12 August 1942 in a five-story chocolate factory with about 63,000 square feet of space and two antiquated elevators, which were frequently out of service. The railhead was about 4 miles from the depot, necessitating movement of stocks by

[6] See footnote 4(4), p. 269.

truck through the crowded city streets of Bristol. The depot reworked unit assemblies (fig. 31, p. 136) received from the United States, filling shortages with items received from British procurement. In October and November 1942, a 750-bed evacuation hospital, a 1,000-bed general hospital, and a 250-bed station hospital were assembled and shipped in support of Operation TORCH. WO(jg.) Lewis H. Williams wrote in 1944 of his earlier experiences:

> Lt. Stohl placed me in charge of assembling this unit and the only things I had to help me was one Basic Equipment List and a prayer. Believe me, I needed both of them, as no one in the Medical Section at that time had any idea of the procedure used in assembling a Hospital, and no one even knew what an assembled Hospital looked like.

In February 1943, the depot's mission was to supply units in the area. About the same time, it acquired 90,000 square feet of space in a nearby four-story building (with a single elevator), which necessitated the physical movement of considerable stock. Early in February 1943, the first depot inventory was taken and a stock record system was inaugurated.

By June 1943, the depot was supplying 40 units in its area in addition to packing unit assemblies. During the year, it built, to varying degrees of completion, several medical maintenance units and final reserve units, one 1,000-bed general hospital, and two 750-bed evacuation hospitals. During October and November 1943, the depot was receiving and processing from 700 to 800 requisitions a month. Before November 1943, if a requisition could not be filled, the requesting unit was instructed to requisition again at a later date. In November 1943, a system of back orders was established and by February 1944, more than 5,000 back orders had accumulated.

Personnel were assigned as casuals to the depot from various units. Changes were frequent, as evidenced by the seven medical supply officers assigned from July 1942 until March 1944. With each change came new methods and procedures. Although the strength fluctuated, there was a gradual buildup; by 31 December 1943, 5 officers, 94 enlisted men, and 91 British civilians were on duty. Maj. (later Lt. Col.) Charles I. Winegard, MSC, on becoming medical supply officer in March 1944, wrote:

> * * * It was organized confusion * * * There was no depot organization—it seemed as everyone was doing what he chose to do. Responsibilities were not defined. The stock record section was undermanned and thru lack of knowledge of procedures were causing themselves a great amount of confusion and overwork. The Shipping Section was located on the top or 4th floor * * * requiring all shipments to be moved to the top floor, assembled, and held there until shipped or called for, when they had to be taken to the ground floor.

In spite of all its difficulties, Depot G–35 performed valuable work in supporting Operation TORCH, in equipping units, in furnishing supplies in operating hospitals, and in manufacturing assemblies. Basically, its difficulties, like those of the system as a whole before March 1944, stemmed from the necessity of operating with inexperienced and, for the most part, inadequately trained personnel.[7]

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[7] (1) Annual Report, Medical Section, General Depot G–35, 1943. The quotations are from (2) Annual Report, Medical Section, General Depot G–35, 1944.

EARLY PREPARATIONS FOR OPERATION OVERLORD

Preshipment Plan

During 1942 and early 1943, plans for invasion of the Continent from the United Kingdom base were rather nebulous. By the summer of 1943, with the North African and Italian campaigns well under way, the plans for the invasion of the European Continent—code name OVERLORD—acquired a noticeable firmness. Medical plans called for the use of the U.K. base not only for mounting the operation and for supply during the first few months, but also for considerable fixed hospital support throughout the campaign.

As mentioned previously, the British were to furnish U.S. forces with 105 fixed hospital plants to house 94,000 beds, complete with housekeeping equipment and some technical equipment. The Supply Division was responsible for equipping these installations and the medical units arriving from the United States and for maintenance support of all fixed and mobile units.

During the last half of 1943, OVERLORD buildup gained momentum as supplies and equipment were being shipped in increasing quantities from the Zone of Interior to the United Kingdom. Under the preshipment plan, medical units deployed from the United States arrived with only basic equipment, which consisted of just that equipment necessary for unit housekeeping and local sick call; for example, mess equipment, some office equipment and medical kits, and one Medical Department chest No. 2.

The intent and theory behind this supply procedure were logical, but the method of execution left much to be desired. Upon debarkation, units were immediately shuttled from the U.K. port to their destinations before their basic equipment could be unloaded. To circumvent this problem of delay, port assemblies, consisting of one Medical Department chest No. 1, one Medical Department chest No. 2 (fig. 69), one small blanket set, one splint set, and two litters, were stocked as assemblies at ports of debarkation for issue to each medical treatment unit. These assemblies enabled medical units to provide emergency medical care for their own personnel and for personnel of surrounding units upon reaching their destination. The original equipment of the units was forwarded by the port medical supply representative as soon as it was discharged from the ship, and upon delivery and issue of full TOE, recipients turned in their port assemblies. This procedure was frequently complicated, however, when all or portions of the equipment became lost in transit, particularly if units had included personal items.[8]

Shipment of Unit Assemblies

Unit assemblies for many units were to be shipped from the United States under the preshipment plan. Because most assemblies shipped from the

[8] (1) Larkey, Sanford V.: Administrative and Logistical History of the Medical Service, Communications Zone, ETOUSA. Ch. VIII, Annex 8: Medical Plans, Mounting the Operation [OVERLORD], 1944. [Official record.] (2) See footnote 4(4), p. 269.

FIGURE 69.—Medical Department chests Nos. 1 and 2, packed for shipment as part of a port assembly.

United States before 1944 were incomplete in varying degrees, this did not work out in practice. Many split shipments, in which parts of an assembly were placed in the holds of different ships, frequently arrived in the United Kingdom at widely separated ports. Often on arrival, parts of assemblies were then shipped to different depots. Complete assemblies and split shipments, arriving in the United Kingdom, frequently were not recognized by the U.K. depots as components of unit assemblies. This led to component items being picked up on depot stock records and stored as bulk stock. Receipts of T/E (table of equipment) equipment for tactical units, the components of X-ray sets, and minor assemblies were treated similarly, meaning that components were placed in depot stock for issue. Stock status records and requirements computations suffered as a consequence. This failure was directly related to unfamiliarity of supply officers with the marking and composition of unit assemblies and to the complex shipping documents.

Entreaties to curtail split shipments were made to ZI ports and to the Surgeon General's Office by cables and letters wherein the causes and problems were outlined. Reassurances were offered, but improvement was slow and

sporadic. Maj. Abraham Freedman, MC, who had spent 5 weeks in the United Kingdom as liaison officer from the Port Medical Supply Division, New York Port of Embarkation, recommended in his report of 22 March 1944 that assemblies and sets should be bulk stowed in one hatch rather than being dispersed throughout the ship. With the approval of the deputy port commander, as of 31 March 1944, this recommendation was put into effect, thus enabling the theater to handle each hospital expeditiously at the port of debarkation.[9]

From the experience of the North African campaign, it was learned that the use of colored markings on shipping containers led to the mixing of medical bulk stocks with unit assembly components, which resulted in the loss of assembly identity. This procedure was eliminated on unit assemblies, and a specific design was imprinted in the assigned color. This exception solved only one of the many problems concerning the unit assembly. It did not provide the rigid controls required for a unit assembly to remain intact from point of origin to eventual destination.

Documentation for all shipments, including unit assemblies, was supposed to be airmailed from the ZI port of embarkation so as to arrive in the United Kingdom well in advance of the shipment dissemination to depots scheduled to receive the shipment. Tardy shipping documents, coupled with the fact that all component parts of a unit assembly rarely arrived at the receiving depot at one time, made it difficult to keep an assembly segregated and intact within the depot, upon receipt. All of these factors allowed loose controls and led to reassembly of equipment for each medical unit; this was an unanticipated workload.

Depot stock records, moreover, were grossly inaccurate, not only as to basic on-hand or inventory figures, but also as to the due-in and due-out figures. This situation, in turn, meant that the consolidated theater stock records in the Chief Surgeon's Office were also erroneous.[10]

Equipping First U.S. Army Units

The Commanding General, First U.S. Army, had been designated as commander of U.S. forces for the Normandy assault. In September 1943, Col. (later Brig. Gen.) John A. Rogers, MC (fig. 70), Surgeon of the First U.S. Army, arrived in the United Kingdom with the advance party which included his deputy, Lt. Col. (later Col.) James Snyder, MC, and the medical supply officer, Capt. (later Lt. Col.) Kenneth E. Richards, MAC.

Shortly thereafter, the advance section was joined by additional staff members from the United States and by a small combat-experienced cadre from North Africa. This cadre included Lt. Col. (later Col.) William H. Amspacher, MC, who became the Surgeon's operations officer. The Surgeon,

[9] Quarterly Report, Port Medical Supply Division, New York Port of Embarkation, to Commanding General, NYPOE, 1 Jan.-31 Mar. 1944.

[10] (1) Personal letter, Brig. Gen. Paul R. Hawley, to Col. Francis C. Tyng, MC, OTSG, 8 Mar. 1943. (2) Personal letter, Brig. Gen. Paul R. Hawley, to Maj. Gen. Norman T. Kirk, TSG, 9 Sept 1943. (3) See ch. VIII, p. 203. (4) See footnote 4(4), p. 269.

FIGURE 70.—Brig. Gen. John A. Rogers.

with his staff, immediately tackled their herculean assignment. Problems encountered in North Africa were carefully reviewed, and consideration was given to detailed planning, to adjustments for inexperience, and to the adequacy of requirements estimates.

With this approach, the First U.S. Army Surgeon's point of reference was anticipated casualties under assault conditions rather than troop strength, with medical units being assigned greater missions than contemplated under the unit tables of organization and equipment. From a supply standpoint, this procedure permitted translation of estimated casualties into materiel requirements. The First U.S. Army developed augmentation lists of items, by types of units, for incorporation into the organic equipment of First U.S. Army medical units, including equipment of other technical services; for example, Engineer generators, Quartermaster tentage, and similar items. Although these augmentation lists were made final late in 1943, items were constantly added or deleted as specific units underwent mission or organizational changes. Changes in assigned missions, changes in commanding officers, or augmentation of professional capabilities greatly influenced materiel requirements.

The original augmentation lists and their justification with materiel requirements were submitted to appropriate technical services. In those instances where requirements were approved but were not available in the United

Kingdom, the technical service had to institute a special project to ship the item requirements from the Zone of Interior. The First U.S. Army, in estimating its needs, solicited the assistance of General Hawley and his consultant staff.

Concurrently, all tactical medical units in the United Kingdom were furnishing medical service to neighboring units and participating in maneuvers and training exercises which resulted in the consumption, loss, or damage of supplies and equipment. Units, therefore, were constantly submitting requisitions to maintain their mandatory 100 percent state of readiness. Although the quantities were unusually small, the requisitions increased the line-item workload at depots, virtually saturating the budding U.K. medical depot system. This further diminished the depots' ability to cope with T/E and augmentation requisitions, with the equipping of hospitals in the United Kingdom, and with the assembly and reassembly program for OVERLORD.

The inability to obtain firm and reliable information on the status of its requisitions for organization and maintenance materiel was a great concern to the First U.S. Army. Confronted with the responsibility of reporting the state of readiness of medical supply to support an invasion timetable, the Surgeon, First U.S. Army, frequently discussed the contingencies with General Hawley, thus maintaining excellent overall knowledge of ability to support combat.[11]

MOUNTING CONCERN OVER SUPPLY

The apprehensions of General Hawley regarding the medical supply situation began building in the fall of 1942. In a letter of 3 November to The Surgeon General, the medical supply situation was pronounced critical.[12] Because of the unreliability of British sources and the failure of complete units to arrive in the United Kingdom, it became necessary to cannibalize more than 30 hospital assemblies to complete the equipment for 11 hospitals embarking on the North African operation.

Throughout 1943, General Hawley frequently corresponded with The Surgeon General about the U.K. medical supply operations. The problem of supplying the First U.S. Army in addition to local units forced General Hawley in December 1943 to state in a letter to Maj. Gen. Norman T. Kirk, The Surgeon General, that the desperate situation was almost beyond hope. It was certain that correspondence would never reconcile the differences between the Surgeon General's Office's recapitulation of shipments to the European theater and the quantities his supply division had recorded as received in the theater. He had pointed out that if his difficulties were not rooted in the ZI system, then they had to be in the ports, in his own supply organizations, or possibly in a combination of the three. Basically, General

[11] Annual Report, Medical Section, First U.S. Army, 1943.

[12] Letter, Brig. Gen. Paul R. Hawley, Chief Surgeon, SOS, ETOUSA, to The Surgeon General, U.S. Army, 3 Nov. 1942, subject: Medical Supply.

Hawley's problems stemmed from an insufficiency of qualified supply personnel, lack of stock, and inadequate systems and procedures.[13]

VOORHEES MISSION

Rapid Survey

In January 1944, The Surgeon General decided that a team should visit the United Kingdom to survey the medical supply system. Headed by Col. Tracy S. Voorhees, JAGD, Director, Control Division, the team included Lt. Col. Bryan C. T. Fenton, MC (fig. 71), Chief, Issue Branch; Lt. Col. (later Col.) Leonard H. Beers, MAC, Chief, Stock Control Branch, who were all from the Surgeon General's Office; and Mr. Herman C. Hangen, consultant to The Surgeon General. Major Freedman, of the New York Port of Embarkation, accompanied the team to survey U.K. port activities. The team, with orders for temporary duty for 60 days, arrived in London on 27 January 1944, and proceeded to visit the supply division office in Cheltenham the next day.

After spending 2 days in Cheltenham studying each supply function and evaluating the personnel handling each operation, the team visited the depots at Taunton and Bristol and the First U.S. Army Headquarters at Bristol on the following 2 days. Colonel Voorhees then returned to London for consultations while the others visited depots, hospitals, and ports.

Recommendations

On 6 February, the team reassembled in London to determine a course of action as it was evident that recommendations for drastic changes had to be made. The group realized that they could be subject to severe criticism for making such recommendations after spending only a few days in the theater; however, it was clear that if more time was spent in verifying conclusions, it probably would be too late to remedy the situation. Therefore, a meeting was arranged for the morning of 8 February, when Colonel Voorhees and Mr. Hangen reported orally, from penciled notes, to General Hawley on the conclusions made by the team over the weekend. The proposals were not experimental as the supply condition in the theater closely paralleled those in the Surgeon General's Office and the U.S. depots 15 months earlier. The recommendations were patterned on the systems that had proved successful in the United States.

Depot Workloads

The first of the three recommendations concerned measures to lighten depot workloads. About 50 percent of depot work was expended in building assemblies and filling shortages of previously built assemblies, resulting in a neglected distribution function. Insufficient stocks did not permit a depot to

[13] Letter, Brig. Gen. Paul R. Hawley to The Surgeon General, U.S. Army, 7 Dec. 1943.

FIGURE 71.—Lt. Col. Bryan C. T. Fenton, MC, Chief, Issue Branch, Surgeon General's Office.

assemble more than 75 percent of the materiel required for a hospital unit. Back orders on components for unit assemblies were piling up and units were unable to obtain essential hospital equipment. Colonel Voorhees recommended that unit assemblies totaling 37,000 beds be shipped complete from the United States, thus relieving theater depots of a substantial workload and also providing more completely equipped hospital assemblies. This number of beds, together with those already assembled in the United Kingdom, would fully equip all hospital installations required in the United Kingdom by 1 May 1944 and those hospital units scheduled for movement to the Continent shortly after the invasion.

Similar difficulties were experienced in assembling medical maintenance units. Packing could not be standardized because stocks of components were not complete in any one depot. Proper packing material for waterproofing and easy handling was not available, and the units being packed in the United Kingdom consisted of 70 pounds of packing material and 30 pounds of supplies. It was recommended that the First U.S. Army and the Chief Surgeon's Office agree on the number of standard medical maintenance units needed and have them shipped from the United States. Units shipped from

the United States would be complete, amphibiously packed, and with a larger proportion of the weight in supplies.

A third means of lightening the workload was to relieve depots of the additional tasks caused by British procurement. Many items of British medical equipment and supplies had proved unsatisfactory as substitutes for American products and generally were not acceptable to professional personnel. British items were unlike their American counterparts because voltages differed, units of measure frequently varied, and packing was unsatisfactory. The mission recommended cancellation or postponement of deliveries on British procurement except for those items which were in short supply in the United States. On deliveries of other than shortage items which had to be accepted, it was recommended that storage space should be obtained to hold those supplies in reserve rather than as active operational stock.

Changes in Supply System

The major deficiency in the supply system was the lack of an accurate central stock control system. In numerous instances, one depot was found to have a surplus of an item while another had many back orders. Each depot took a monthly inventory, but, as there were no due-in figures and no uniform cutoff between inventory, issues, and due-ins among the several depots, these inventories were of little value. A weekly report on critical items, whose preparation by the depots required much work, had insufficient data to be of much value. A third report, a daily one on items reaching a minimum quantity, was unreliable as there was little relationship between minimum quantities and current issues.

To correct this condition, installation of a stock control system similar to that used in the Surgeon General's Office was recommended. This recommendation provided for a biweekly stock report from all depots which would be consolidated in the Chief Surgeon's Office. The consolidated stock report would form the basis for computation of quantities to be requisitioned from the United States, to distribute incoming stocks to depots more accurately, and to control stock levels.

In medical supply, many important items on which quantities issued were very small had been widely dispersed upon receipt, making it difficult to locate the item when needed. A key depot system was suggested, whereby certain depots would be given priority on incoming shipments on one or more classes of items. It was decided that dispersion of stocks would be lessened with a maximum of 20 percent of an item stock to be located in one depot.

Another serious deficiency was found in the lack of control of the levels of supplies and equipment maintained in hospitals and field units. Units, having attempted to obtain an item from one depot only to have it placed on back order, frequently went to another depot and secured the item while the original depot furnished the back ordered item when it became available. To overcome this system deficiency, it was proposed that an issue branch of the Sup-

ply Division develop stock levels for hospitals and field units, control requisitioning, and secure returns of excess stock in the hands of units.

All depots needed rewarehousing to save space and to make stock more accessible. There was no standardization of storage methods. Each depot packed according to its own design and there was no knowledge of amphibious packing methods that had been developed in the United States. To correct these conditions, it was recommended that a depot technical control branch be established in the Supply Division to develop standing operating procedures and to supervise all depot operations.

Changes in Organization and Personnel

In neither the Supply Division nor in the depots were there sufficient personnel to handle the workload. Efforts were expended in meeting emergencies without any time remaining to install proper systems and plans. Personnel were unfamiliar with the many improvements that had been made in supply management in the United States during the previous year. To improve the organization, it was suggested that the Supply Division be patterned on the organization in the Surgeon General's Office. This organization would require an additional 15 officers and 44 enlisted men for staffing the Supply Division.[14]

Approval of Recommendations

General Hawley accepted the proposals in their entirety. A teleprinter conversation with the Surgeon General's Office was arranged for 10 February, and a summary of the facts and conclusions was furnished, together with a request for personnel by name to fill important positions in the supply organization. The Surgeon General's Office agreed to send the personnel, including Col. Silas B. Hays, MC, for Chief of the Supply Division. Colonels Fenton and Beers and Mr. Hangen went to Cheltenham on 14 February and proceeded with the reorganization, pending the arrival of Colonel Hays. Colonel Voorhees and Mr. Hangen returned to Washington in March while Colonels Fenton and Beers remained as permanent members of the Supply Division's staff.[15]

REORGANIZATION FOR INVASION

Personnel Reorganization

On 3 March 1944, Colonel Hays, formerly of the Surgeon General's Office, was designated Chief, Supply Division, Chief Surgeon's Office, ETOUSA. The division had been reorganized into four branches—Administration and Finance, Stock Control, Issue, and Depot Technical Control. The staff was

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[14] Report, Col. Tracy S. Voorhees, JAGD, and others: Survey of the Medical Supply Situation in the European Theater, January-March 1944.

[15] Report of Teleprinter Conference with Representatives of the Surgeon General's Office and the Chief Surgeon, ETOUSA, 10 Feb. 1944.

increased rapidly from 16 to 32 officers while enlisted personnel increased from 47 to 84. Thirteen British civilians also were employed.

In addition to staffing the Supply Division in Cheltenham, two officers—Maj. W. A. King, SnC, and Capt. (later Maj.) Joseph B. Parks, MAC—with four enlisted men were attached to Headquarters, Advance Section, Communications Zone, at Bristol. Their function was establishing stock control procedures for operations on the Continent as the Advance Section assumed jurisdiction of rear areas.[16]

Depot System Realinement

Under the direction of Maj. Robert R. Kelly, MC, Chief of the Depot Technical Control Branch, four new depot companies (the 63d, 64th, 65th, and 66th) were organized under TOE 8–661, and five depot companies (the 6th, 11th, 13th, 15th, and 16th) were brought up to TOE strength. One company, the 8th, was deactivated. Because of wide dispersion of stocks in small medical depots and medical sections of general depots, it was impossible to employ an entire depot company at one location. As a result, depot companies did not operate as a unit in the United Kingdom, but rather were employed as an administrative headquarters for the assignment and control of their personnel.

Before D-day, there were, in addition to the companies just indicated, the 1st Medical Depot Company which was attached to the First U.S. Army, and four companies (the 30th, 31st, 32d, and 33d), which arrived in April and May 1944, for a total of 14 companies in the United Kingdom.

The 30th and 31st Medical Depot Companies were assigned to the Medical Service, Headquarters, ETOUSA, and designated for Communications Zone operations on the Continent after the invasion was underway. The 32d and 33d Medical Depot Companies were assigned to Third U.S. Army. The 13th Medical Depot Company was also designated for subsequent move to the Continent as soon as U.K. operations permitted. A key depot system was established within the distribution depots in the United Kingdom during March 1944 to overcome excessive dispersion of stocks, expedite the handling of requisitions, eliminate the large quantity of back orders, and drastically reduce extracting of requisitions to the Chief Surgeon's Office. The key depot system effectively accelerated the delivery of available supplies (table 4).

Key depots were given the highest priority for receipt of stocks from the United States. They were stocked to 100 percent of their stock levels before incoming receipts were distributed to non-key depots. Where insufficient stocks were received to fill key depot levels, the items were prorated to each key depot.

Except for assemblies, units and installations requisitioned supplies and equipment from designated area distribution depots, which virtually eliminated "shopping around" from depot to depot. When non-key depots were out of stock, the item was extracted automatically to the key depot for the area. When a key depot was out of stock, a back order was established so that

[16] Annual Report, Supply Division, Office of the Chief Surgeon, ETOUSA, 1944.

TABLE 4.—*Key depot system, United Kingdom, 1944*

Depot	Location	Supplies
Medical Section, G–20	Burton upon Trent	All items except for spare parts, lamps, batteries, teeth, blank forms, and veterinary supplies.
Medical Section, G–30	London	Veterinary supplies and blank forms.
M–400	Reading	Spare parts, batteries, and lamps.
Medical Section, G–35	Bristol	Drugs, biologicals, surgical dressings, and instruments.
Medical Section, G–50	Taunton	Laboratory supplies; dental, X-ray, hospital, and field equipment.
Medical Section, G–45	Thatcham	TOE assemblies.

shipment would be made upon receipt of stocks. Periodically, the Chief Surgeon's Office directed key depots to extract their back orders to other depots where the stock status report indicated that stock was available.[17]

Medical Depot Manual

To establish uniform operations in all medical depots, a medical depot manual was published by the Chief Surgeon's Office during March 1944. This manual facilitated storage and issue operations and provided the basis for a biweekly stock reporting system, which was the feeder report for compiling the theater consolidated stock status report. Quantities due-in, quantities on hand, and back orders for each item were recorded on depot stock reports. The consolidated report was the basis for determining theater requirements and for preparing and submitting requisitions to the Zone of Interior.[18]

Stock Control

The authorized theater stock level of 75 days consisted of quantities required for 45 days of operation plus 30 days' stock as a reserve or safety level. At the beginning of March 1944, depot stocks were badly unbalanced; numerous items were on hand on which stock was small or depleted while on others, the quantities exceeded 12 months' requirements.

One major objective of the Voorhees mission was the establishment of modern merchandising procedure to control supplies and balance depot stocks. This requirement was tackled immediately by Colonel Beers, a member of the Voorhees mission. A new system which included the use of electric accounting machines was soon installed. Fortunately, machines for compilation of medical statistics were already in operation at Cheltenham. By being worked extra

[17] See footnotes 15, p. 283; and 16, p. 284.

[18] Medical Depot Manual (Tentative), Office of the Chief Surgeon, ETOUSA, 21 Mar. 1944.

shifts, these machines were able to assume the additional load of stock control. An authorized level of supply was established for each item that was to be stocked in the theater with a reorder point. The reorder point was the authorized level of supply for each item plus lagtime (the length of time from the date of the requisition to the Zone of Interior until the supplies were received in a theater depot and available for issue).

A study on the stock position of each item was made each 30 days. When stocks on hand plus due-ins were below the reorder point, a requisition was placed on the New York Port of Embarkation for replenishment in an amount sufficient to bring assets up to the reorder point. Current stock levels, which would permit flexibility and allow adjustments for changing conditions, were established by this method.

The theater stock level for each item was computed by using the authorized War Department replacement factor or, when this factor proved inaccurate, a theater replacement factor was computed on the basis of issue experience. To the authorized 75 days' level of supply was added the lagtime factor, averaging 105 days, to establish the reorder point. The reorder point was established at 180 days and the quantitative requirements were computed by using the current troop strength for the requisitioning period. The product of multiplying the average troop strength by the replacement factor was then multiplied by the number of months for which the supplies were being computed to arrive at the reorder-point quantity. Under this system, theoretically, the stock on hand of each item would fluctuate between 45 and 75 days of supply.[19]

Stock Distribution

Stock levels for individual depots were based on the total troop strength served by the depot. Before the reorganization, there was no stipulated level of supply for each depot. In March 1944, realinement of stocks within the U.K. depots to conform with the newly established levels under the key depot system was accomplished virtually overnight. Depots submitted current stock reports simultaneously, which were reviewed to determine the necessary interdepot transfers. Transfers were effected by trucks organic to medical units according to an exacting schedule that assured maximum payloads in each direction with a minimum of trucks and time.

Stock adjustments, sustained by accurate inventories plus improved stock control and back-order procedures, quickly eliminated major problems in the inventory control system, except for problems connected with overall stock imbalances. On 1 April 1944, stock status reports indicated that 3,603 items were in the ETOUSA medical supply system. Quantities on hand indicated that 1,473 items (41 percent) were in short supply, 214 items (6 percent) were in good supply, and 1,916 items (53 percent) were in oversupply.

[19] (1) See footnotes 14, p. 283; and 16, p. 284. (2) Letter, The Adjutant General to Commanding Generals, all theaters, 20 Jan. 1944, subject: Levels of Supply for Overseas Areas, Departments, Theaters, and Bases.

Items in short supply were requisitioned from the United States and priorities were requested for prompt and early shipment. By 1 May 1944, the stock position had changed materially and the buildup of stock levels was underway. Reorganization of the stock control system had provided the Chief Surgeon's Office with the means to determine the stock on hand and the normal requisitioning requirements, and to control distribution of items in short supply. During May 1944, medical supply operations approached a near routine state. In fact, except for a few last minute actions, there was a comparative lull in the Medical Supply Division, Chief Surgeon's Office, during the 10 days immediately preceding the invasion, but the depots were still grinding out the preplanned shipments for the buildup on the Continent.[20]

Resupply Requirements

Concurrently with the buildup of U.K. stocks in the spring of 1944, planning for maintenance support of continental operations required immediate attention. The Surgeon of the First U.S. Army was responsible for determining requirements for maintenance and replacement supplies for D-day to D+14, including Air Forces medical requirements on the Continent. The Surgeon, Advance Section, Communications Zone, was responsible for D+15 to D+41, with the Surgeon of the Forward Echelon Headquarters, Communications Zone, responsible for D+42 to D+90. Actually, representatives of the Surgeon, First U.S. Army, and the Chief Surgeon, ETOUSA, collaborated in this total work, inasmuch as neither the Advance Section nor the Forward Echelon was staffed with sufficient personnel experienced in stock control and requirements determinations. Computation and requisitioning of maintenance supplies and equipment were particularly difficult as only limited experience data were available for an operation of this type. Estimated battle losses, shipping losses, and normal maintenance based on casualty estimates were necessarily considered in computing requirements.

Following D-day, the European theater was to be involved in a dual logistical effort, with operations in the United Kingdom and those on the Continent being distinctly different in character. Separate maintenance requirements had to be computed for each area. Those for the United Kingdom were largely for fixed medical installations, such as general hospitals, while those for the Continent included the mobile units of the Armies as well as fixed installations in the Communications Zone. It was planned to support operations on the Continent from the United Kingdom for the first 90 days and then to depend largely on direct supply from the United States to continental ports.

Replacement supplies for D-day to D+14 were to consist of automatic shipments on a prescheduled basis from U.K. depots to beaches and ports on the Continent.

Colonel Rogers, of the First U.S. Army, and his staff examined the items in the standard medical maintenance unit in light of anticipated casualties

[20] See footnote 16, p. 284.

rather than the supplies required for a stated force strength. It was anticipated that peak casualties would occur during the period when forces were numerically small. Moreover, it was determined that the type A standard medical maintenance unit for 10,000 men for 30 days was inadequate and deficient in various critical items. Additional maintenance lists developed by the First U.S. Army included a divisional assault maintenance unit type D, which had two sections—one containing supplies to care for 1,000 medical casualties and the other having sufficient supplies for 1,000 surgical casualties—and a supplemental D unit containing supplies considered essential but not included, or insufficient in quantities, in the A and D units, to serve both as a supplement and a reserve. Divisional assault supplemental units carried additional quantities of material, such as plaster of paris, sheet wadding, cocoa, instant coffee, and medical gases, as insurance against extreme consumption. Also developed was a type G unit containing supplies for treating 1,000 gas casualties in the event that the enemy used poison gases.

In addition, bulk quantities of equipment were phased in which had not been included in other resupply units. Selection of the items that could possibly benefit the operation through D+30 was made by reviewing medical unit assembly equipment lists and theater augmentation lists. Quantities, to a large degree, were governed by availability and by tonnage allocation. Some portion of each item was scheduled for arrival by D+5, but no attempt was made toward uniformity of each day's shipment. Surprisingly, two of the items that proved most beneficial were washing machines and sewing machines, which were essential in maintaining the supply of linens, such as the towels and drapes for the operating rooms.

Replacement of equipment lost or damaged by troops going ashore was also computed as a maintenance requirement. Except for airborne units, it was estimated that 15 percent of the equipment would be lost on D-day, that troops going ashore by D+4 would lose 8 percent of their equipment, and that by D+10, this factor would level off at a 5 percent loss factor. Airborne replacement requirements were estimated at 100 percent. These estimates proved to be reasonably accurate.

Theater directives placed a responsibility upon the Chief Surgeon to determine and provide automatic shipment of maintenance supplies, based on phased tonnage and priority allocations authorized for medical supplies, and the phased estimate of casualties by type. Requirements for D+15 to D+90 were computed by the Supply Division, Chief Surgeon's Office.

Requirements for D-day to D+90 included 100 type A maintenance units, 114 type D surgical units, and 22 type D medical units. It was intended that all type A maintenance units were to be assembled and shipped from the United States to the United Kingdom, but sufficient quantities did not arrive in time and many had to be built in U.K. depots at the last moment. The D and the G units were assembled in U.K. depots.[21]

[21] See footnote 16, p. 284.

Packing and Crating

The Voorhees mission discovered that the quantity and variety of medical maintenance units included in First U.S. Army requirements for the assault imposed a significant packing and crating requirement. Also, training in the United Kingdom made it imperative that unit personnel open, inspect, become thoroughly familiar with, and repack, the equipment to be used in combat (fig. 72). Because of the concentration of troops in the United Kingdom, OVERLORD medical units supplemented fixed medical facilities by providing dispensary-type medical care to troops in the immediate staging or training areas.

For the reasons just stated, medical units, including small detachments and field and evacuation hospitals, opened their ZI waterproof-packed equipment and supplies. The Voorhees mission realized that an expanded packaging and crating program had to be generated swiftly in the United Kingdom under an experienced officer. Consequently, Capt. (later Maj.) William B. Wagner, MAC, was recommended to The Surgeon General for assignment to the Medical Supply Division in view of his experience in developing the ZI depot packing and crating program.

The ETOUSA packing and crating requirement had two separate facets: first, accomplishment of the workload by depots in packing the maintenance stocks and unit assemblies constructed in U.K. depots for shipment to the Continent; and second, instruction to unit personnel on packing their equipment for an amphibious operation. A scarcity of packing material and a narrow margin of time confronted Captain Wagner upon his arrival in the United Kingdom on 26 February 1944.

Waterproofing Boxes

An adequate supply of sisal paper, waterproof cement, lumber or boxes, nails, and binding equipment was a prerequisite to waterproofing supplies. Since sisal paper and cement were not available in the United Kingdom, the program had to begin with available substitutes pending the arrival of stocks from the United States. Binding and marking materials and acceptable waterproof paper were available, which, together with hot tar and hot asphalt, served as alternatives. Careful reclamation of ZI fabricated boxes and insulation material, augmented by box shooks and lumber obtained from the Quartermaster Corps, provided the balance of the required material. Some additional material was obtained on the British market.

Skid Loads

To afford further protection to individual boxes of supplies, to facilitate handling in transit, and to prevent individual packages from going astray, a skid-loading plan was developed which was patterned after that used in the Mediterranean area. The skid consisted of a platform built from 2-inch lum-

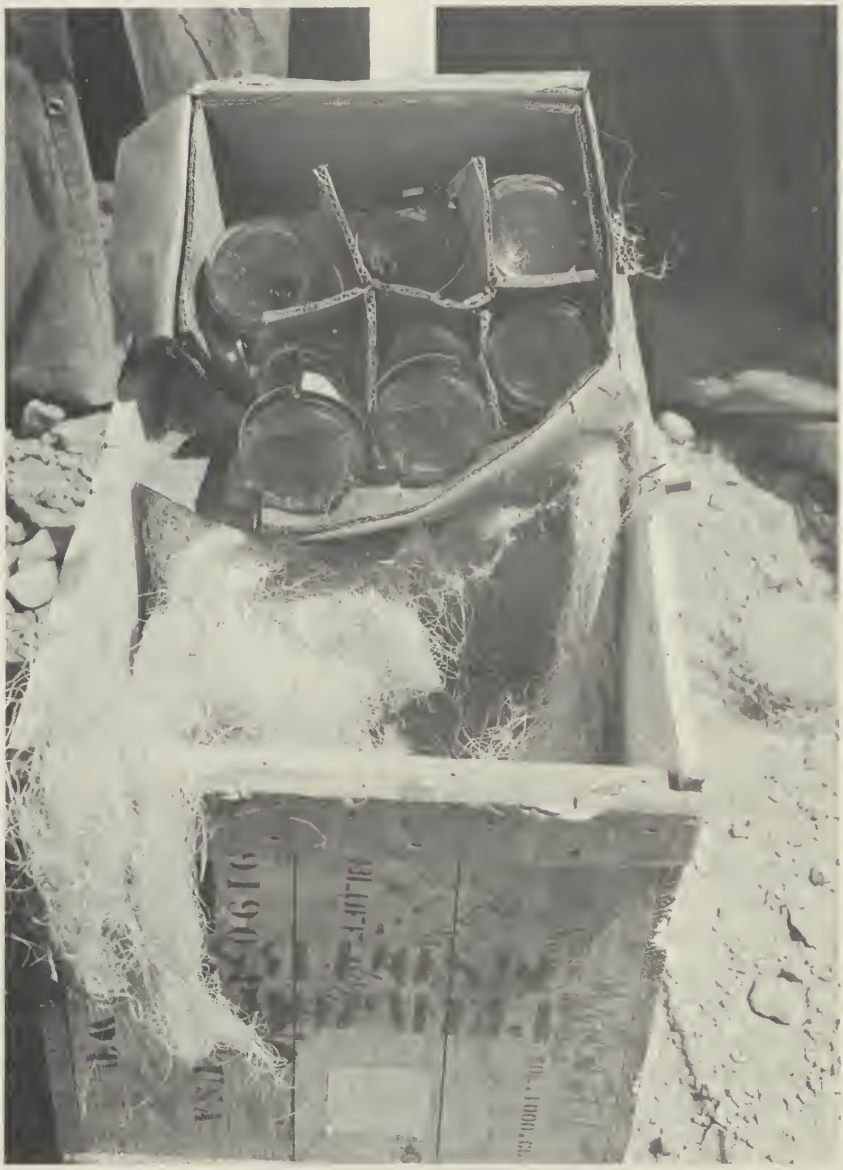

FIGURE 72.—Breakage of medical supplies on incoming shipments.

ber to dimensions of 4- by 6-feet, mounted on two 6- by 6-inch skids, which were tapered in sled-runner fashion. A heavy clevis was attached to the front to aid towing. Skid loads were approximately 5 feet high, completely covered with canvas, and banded with one horizontal and three vertical 1½-inch metal bands. Slots were cut in the top of the skid runners to anchor the vertical bands and the load.

Processing Unit Equipment

Units anticipated the need for breaking out their equipment, setting up, dismounting, and repacking for movement during combat. Mobility and the time factor would be particular problems for field and evacuation hospitals. Ordinary merchandise boxes would not suffice for repeated packing of equipment; a reusable container was required. Some units had attempted to improvise by installing hinges and hasps on discarded ammunition cases, rifle cases, and similar boxes. Generally, the improvised containers were heavy, too small, and lacked permanent waterproofing features.

One of the first actions growing out of the Voorhees mission was the dispatch of a cable to the Surgeon General's Office in February 1944 for 10,000 Wherry boxes. Captain Wagner, working with the Wherry Luggage Co., had previously promoted the development of a box that was permanently waterproofed, sturdy, lightweight, and equipped with nonprotruding handles, hasps, and hinges. The container was waterproofed by sealed seams and a combination of hasps and hinges which compressed the lid on four sides against a fixed sponge, plastic, or rubber gasket.

The boxes, usually filled with supplies to conserve shipping space, were requisitioned in February and began arriving in the United Kingdom during March. They were distributed immediately to all medical units for the repacking of their equipment and supplies.[22]

Assembly for Prescheduled Shipment

By 1 May 1944, the maintenance supplies required for D-day to D+15 were assembled and packed on skid loads. All maintenance supplies required for shipment to the Continent before D+60 were amphibiously packed to withstand wave action and 90 days of open storage. Many of these supplies were packed in the Wherry boxes.

A total of 955 skid loads, approximately 725 long tons, was assembled and scheduled for movement from specified depots to designated ports of preloading well in advance of D-day. Included in the skid loads were 30 type A maintenance units, 92 surgical divisional assault units, 22 medical divisional assault units, 30 divisional assault supplementary units, and 10 gas casualty units. An additional 2,400 skid loads of medical supplies were packed by U.K. depots and shipped to the beaches during the first 60 days of the invasion.

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[22] See footnotes 14, p. 283; and 16, p. 284.

Skid loads, although unwieldy and requiring a crane for loading and unloading, provided a means to keep a balanced functional supply unit together during the early days of the invasion. Where there were surgical needles, there were always sutures; administration sets accompanied solutions. Instruments for surgical needs were kept together. Sufficient skids were built for the using units because many loads were eventually broken down, and the individual items were placed in depot stocks on the Continent.[23]

Medical Tonnage Allocation

In planning the cross-Channel assault, combat elements and weapons commanded top priority in tonnage allocations and dictated the total shipping space that could be assigned to supply support and for the buildup of stock levels on the Continent. The allocation for medical supplies (not including unit equipment) was limited to 100 tons per week during the assault phase.

In early April 1944, G–4, Services of Supply, directed each technical service to submit a schedule showing the weight and cubage to be shipped to the Continent, based on the tonnage allocation for D-day and for each subsequent day to D+30, and identified with the shipping depot. Such information was essential for determination of "goods wagon" requirements, rail shipping routes, traffic control, ship space, berthing of vessels for preloading, and port of return for reloading of vessels. Unfortunately, the G–4 deadline for the technical service schedule came before the Medical Department could effect a final stock check and assign the total assembly skid-loading program to depots. The skid-loading program had been started by the Medical Department before the reporting date, however, and the experience offered an excellent basis for calculating the weight and cubage of daily shipments. The shipping depot was not so easily determined.

Supplementary Means for Assault

The total calculated medical resupply requirements consisted of an average of .333 pounds per man per day up to D+51. The medical supply tonnage allocation priority during the assault phase, however, was considered dangerously close to the estimated requirement, leaving little margin for error. Moreover, Major Richards, the First U.S. Army medical supply officer, was reluctant to assume that all allocated tonnage would arrive on the beaches as scheduled. Some alternate method had to be found to phase in auxiliary maintenance supplies to assure support of the anticipated casualty rate during the first day of the invasion. As a result, new items were developed which greatly aided early medical support.

Mortar shell cases.—The mortar shell case medical package designed for the assault troops was comprised of a special waterproofed unit of medical supply which would float and would serve as a life preserver for an individual. A unit consisted of seven specially treated mortar shell cases, each of which

[23] See footnote 16, p. 284.

contained several items (fig. 56, p. 234). These units were issued as follows: one unit per infantry battalion, artillery battalion, chemical battalion, engineer battalion, and ranger battalion; two units per divisional collecting company; four units per divisional clearing company; six units per medical battalion (Engineer special brigade). Additionally, units were loaded aboard every conceivable type of vessel moving to the far shore through D+5. Personnel on board were instructed to drop the units on the far shore or overboard close to the shoreline and to rely on the tide to carry them ashore.

Assault vest and maintenance units.—The assault vest was merely a hunter's vest that the medical supply officer of the First U.S. Army had had fabricated to increase the carrying capacity of the medical aidman during the initial assault. The many-pocketed vest accommodated small medical items peculiar to the aidman's kit.

The two-man carry maintenance unit was designed to provide a substantial quantity of fast-moving items to the medical units that accompanied various assault forces. The items were packed in boxes that could be carried ashore and overland for a reasonable distance.

The purpose of these little units was to breach unforeseen weakness of the medical units' reserve supplies and to assure availability of the selected items through the first few days of the anticipated confusion. The units proved extremely valuable in the early hours of the assault because of the delay in unloading medical supplies. Many floating mortar cases were found by the advance detachment of the 1st Medical Depot Company in establishing its medical supply dump on D+3.[24]

Army-Navy exchange units.—Designed primarily as automatic resupply of the property exchange items dissipated during the early stages of evacuation to the United Kingdom, each unit consisted of 100 litters, 320 blankets, 4 splint sets, 3 boxes of surgical dressings, and 96 units of normal human plasma. The proposed number of units precluded their movement within the space allotted to Medical Supply, so arrangements were made with the U.S. Navy to place one unit aboard each of the first 100 LST's (landing ships, tank) moving to the Continent. The Medical Supply Division was to find ways and means for delivering the remaining 200 units, which were moved as rapidly as possible on hospital ships and other vessels embarking for the Continent.

Equipping First U.S. Army units with their authorized equipment was the first major task during the buildup period. In February 1944, orders were issued by First U.S. Army Headquarters for a showdown inspection by all units to determine if any shortages of items were authorized by appropriate tables of equipment, tables of basic allowances, or by theater directives. Issue of equipment against unit shortages presented some problems. The heavy telephone traffic, the lack of transportation, and the continued movement of units from the campsite to another in the United Kingdom made it difficult to place available items in the hands of units within a reasonable period of time. To

[24] (1) Annual Report of Medical Activities, First U.S. Army, 1944. (2) Annual Reports, 32d and 33d Medical Depot Companies, 1944.

alleviate this condition, Major Richards arranged for the 1st Medical Depot Company to consolidate the shortage requisitions from all units for presentation to depots and to pick up and deliver the items to the units.

The same method was used by Third U.S. Army's 32d and 33d Medical Depot Companies during April and May 1944. These companies, used as distributing units in southern and central England, received and consolidated requisitions from units within their areas, presented the consolidated requisitions to depots, and picked up and distributed the supplies to the units. This procedure was eminently satisfactory as it reduced the pressure on U.K. depots and eliminated many distribution problems.

Problems Under the Preshipment Plan

The most serious problem on the preshipment plan was the short period between the discharge of the cargo in the theater and the arrival of the unit. The plan was predicated upon the arrival of the equipment at least 30 days in advance of the unit, but changes in tables of equipment, frequent delays in transit, and losses and damage to equipment caused many difficulties. Deficiencies in packing major items of equipment, such as X-ray, were frequently experienced.

Constant reorganization of tables of organization and equipment of units by the War Department was a major problem. Frequently, the equipment was shipped under an old table of equipment while the personnel were organized under a new table. At times, the theater was not aware of the change until the movement order for the unit was received identifying a new table of equipment. This difficulty was eventually corrected by the establishment, with War Department approval, of a list of T/E's, which were applicable in the theater regardless of those listed in the War Department movement order. The Medical Department promoted this method through G–4, Services of Supply.

Another difficulty during this period pertained to War Department publications, including the *Army Medical Bulletin*, which often listed and highly recommended various new items long before their availability in the theater. The Supply Division and depots were constantly besieged with requisitions for such items, and professional personnel could not understand the reasons for nonavailability of the item in view of the official publication.[25]

Augmentation Equipment for Units

Issue of field equipment to units was not complete, however, with the furnishing of initial equipment authorized by tables of equipment or tables of basic allowances. Supplementary lists of material for units and provisional units had to be dealt with immediately. For the most part, medical items so authorized were filled from stocks available in the theater.

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[25] (1) See footnote 16, p. 284. (2) Standing Operating Procedure for the Issue of Initial Organizational Equipment to U.S. Forces in the U.K., 28 Mar. 1944.

An authorization for equipment in excess of tables of equipment was established for such units as evacuation and field hospitals, infantry, airborne and armored divisions, convalescent hospitals, engineer combat groups, auxiliary surgical groups, and medical depot companies. As an example, the medical battalion of the Engineer special brigade was authorized X-ray and fluoroscopy units, oxygen therapy apparatus, anesthesia apparatus, and accompanying auxiliary items. As this organization was to be the first medical unit ashore in the assault phase, it needed the essential equipment to provide more definitive medical service.

During a similar landing operation in the Sicily Campaign, a critical need existed for X-ray equipment to determine the presence of shell fragments in wounds, and for inhalation anesthesia. The anticipated isolation of airborne units from the main invasion body was another consideration in furnishing items in excess of allowances to those troops. Hence, mission requirements became a determining factor in augmentation issues and in establishing the need for additional quantities of medical supplies and equipment.[26]

Arrival of Third and Ninth U.S. Armies

When additional Army headquarters arrived in 1944, the tactical units were reallocated and each Army proceeded to determine its own T/E augmentations according to its mission and the Surgeon's estimate of the situation. To some degree, this was equivalent to designing separate T/E's for the medical units of each Army. Some complications resulted when units were shifted between Armies before D-day, and a transfer of augmentation material was necessary. The three different standards for T/E supplementation supplies necessitated an increased line item stockage in Communications Zone depots.

The difficulties experienced in furnishing augmentation equipment to First U.S. Army medical units had some repercussions. Col. (later Brig. Gen.) Thomas D. Hurley, MC, Surgeon, Third U.S. Army, contacted the Supply Division, Chief Surgeon's Office, immediately after his arrival in the United Kingdom with the advance party, on 23 March 1944, expressing anxiety over medical supply. Before his departure from the United States, Colonel Hurley had learned of the Voorhees mission and the heavy supplementation program for First U.S. Army units, which caused him to question the capability of General Hawley's Supply Division to render adequate medical supply support to Third U.S. Army units. It was necessary to assure the Third U.S. Army Surgeon that assets were available and that the Supply Division was ready to support initial issue and supplementary requirements. The same task was performed when Col. William E. Shambora, MC (fig. 73), Surgeon,

[26] Letter, Col. W. L. Perry, MC, Chief, Supply Division, Office of the Chief Surgeon, ETOUSA, to The Adjutant General (attention: Operations Division, War Department General Staff), 26 Oct. 1943, subject: Project No. 2, "Surg," Requisition A.287, 20 October 1943, for Auxiliary Mobile X-ray Units.

FIGURE 73.—Brig. Gen. William E. Shambora.

Ninth U.S. Army, arrived in the United Kingdom with similar apprehensions.[27]

Supply of Units Reaches Peak

As preparations continued, all units became supersensitive to supply problems and the Chief Surgeon's Office was flooded with requisitions for shortages. Requisitions were to be funneled through parent organizations in accordance with theater directives. Despite these directives, the requisitions of many units came directly to the Chief Surgeon's Office. Unfortunately, many requisitions were submitted before the units were alerted; then, upon being alerted, units were instructed to hold showdown inspections and submit requisitions for all items not on hand. Duplicate requisitioning resulted when units had not picked up the items at depots before submitting the second requisition. Furthermore, virtually every unit, regardless of size, submitted a number of showdown requisitions before its departure from the United Kingdom. One division submitted 15 showdown requisitions within 18 days.

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[27] (1) Annual Report, Medical Section, Third U.S. Army, 1944. (2) Annual Report, Medical Section, Ninth U.S. Army, 1944.

The significance of these actions can best be exemplified by the fact that U.K. depots were carrying hundreds of items on their shipping floor awaiting pickup. Major Winegard, at Depot G–35, first brought this situation to the attention of the Chief Surgeon's Office, ETOUSA, in late March 1944 by reporting that he had more than 2,000 items awaiting pickup. A policy of early cancellation of all such shipments permitted recovery of many items in short supply.[28]

Availability of stocks ceased to be a major problem toward the end of May 1944. It was necessary at times, however, to pick up equipment from discharging vessels to fill shortages in organizational equipment for high-priority units. Also, it was necessary occasionally to divert equipment from low-priority units to others of higher priority. The perpetual problem throughout this period was transportation. Rail transport of less than carload lots was impractical. As a consequence, all U.K. depots were instructed to ship to field units by truck and, wherever possible, to have the items picked up by the organization. The First U.S. Army organized trucking companies into distributing units for pickup and delivery of supplies to units after unit transportation had been processed for shipment to the Continent and was not available for this purpose.[29]

SUPPLY IN FIXED INSTALLATIONS

In fulfilling the supply requirement for new hospitals and bed expansion to meet the anticipated casualty load, it was necessary to resolve two major problems concerning the proper distribution of equipment.

Split shipment of unit equipment when it was loaded on two or more ships in ZI ports and discharged at separate U.K. ports was the first problem. This dilemma had been the subject of much correspondence between the Chief Surgeon, The Surgeon General, and the New York Port of Embarkation. A representative of the port visited the theater with the Voorhees mission to study the problem, which apparently was resolved by the New York port in April, when shipments of unit assemblies began to arrive in the theater intact.

A second problem concerned the retention of all components of the unit assembly in one place for shipment to its destination. This handicap required action within the theater. A study was made of the availability of hospital plant sites, and the plausibility of shipping unit assemblies from U.K. ports directly to operating sites. Except for those assemblies which were to be stored in depots pending transshipment to the Continent, direct shipment of assemblies to operating sites would permit bypassing medical depots which were heavily engaged in preparations for Operation OVERLORD.

Consultations with port commanders at Bristol, Cardiff, Newport, Swansea, Hull, and Liverpool, and with the Transportation Corps established

[28] (1) See footnote 16, p. 284. (2) Administrative Memorandum No. 56 (Supply No. 11), Office of the Chief Surgeon, ETOUSA, 29 Apr. 1944, subject: Supply Policies and Procedures.

[29] See footnote 16, p. 284.

the feasibility of the plan, and a standing operating procedure was developed, placing the plan in effect. The Chief Surgeon's Office was required to notify port commanders of the identity of the unit assembly and the appropriate destination so that a timely levy could be made on the Transportation Corps for rail transportation. Railroad cars were switched onto quay side so that the unit assembly was discharged directly from ship to car. Each port was staffed with a Medical Administrative Corps officer and several enlisted personnel to assist in maintaining the integrity of each unit assembly.

Because construction of the new hospitals was incomplete, unit assemblies were shipped directly from the ports to the hospital sites and stored there, pending availability of the buildings.

Medical depots sent representatives to the site to tally-in the equipment, check it against shipping documents received from the port, arrange for proper storage and protection of the assembly, and, finally, turn over the equipment to the unit upon its arrival. This procedure operated effectively and in no instance was the opening of the hospital delayed because of lack of medical equipment.

Sixty-eight hospital assemblies were received from the Zone of Interior between 30 March and 25 May 1944, comprising 53,300 hospital beds. These shipments included twenty-nine 1,000-bed general hospital assemblies and eight 750-bed station hospital assemblies required to complete the hospitalization program in the United Kingdom.[30]

Supply of Air Forces Units

Supply of Air Forces units differed from ground and service units. Dispensaries at Air Forces bases were operated under the direction of the Air Surgeon although all hospitalization of Air Forces personnel was provided by station and general hospitals in Services of Supply. Distribution of medical field equipment and maintenance supplies to Air Forces units was effected by aviation medical supply platoons, which drew their supplies from the U.K. depot system.

Problems between Air Forces authorities and General Hawley over the equal distribution of supplies was the subject of many letters to The Surgeon General during 1943. However, after numerous conferences, stocks in the U.K. depot system reached a reasonable level in mid-April 1944, and there were few difficulties in furnishing support for Air Forces units.[31]

Special Supply Projects

Furnishing organizational equipment to units, including items in excess of allowances, did not completely fulfill the need for essential equipment

[30] Memorandum, Maj. Gen. LeRoy Lutes, GSC, Director of Plans and Operations, Army Service Forces, to Maj. Gen. Paul R. Hawley, 29 Apr. 1944, subject: Medical Supplies; and 1st Indorsement thereto, 1 May 1944.

[31] Link, Mae Mills, and Coleman, Hubert A.: Medical Support of Army Air Forces in World War II. Washington: Office of The Surgeon General, U.S. Air Force, 1955, pp. 563–565.

required for the medical care of anticipated casualties on the Continent. The nature of the assault, a combined amphibious and airborne operation, the magnitude of the troop strength, and the anticipated resistance by enemy forces caused planners in the Chief Surgeon's Office and in the First and Third U.S. Armies to request additional equipment for medical support purposes.

PROCO Projects

A group of projects, established under the direction of G–4 to support operations, were known as PROCO (Projects for Continental Operations) projects, which included medical as well as other technical services equipment required by medical units. These projects included the mounting of X-ray equipment on trucks to provide six mobile X-ray units for support of the First and Third U.S. Armies, the provision of equipment for establishing blood banks in the United Kingdom and on the Continent, and the equipping of vehicles with medical items for mobile surgical units. PROCO requirements for tentage,[32] tent stoves, and other items of hospital equipment rose steadily as D-day approached.

SUPPLY POINTS IN MARSHALING AREAS

Advance supply points, operated by detachments of the 66th Medical Depot Company, were established at Dorchester, Totnes, and Plymouth in the Southern Base Section to support units massing for the assault. Three supply points were established also in hospitals at Govilon, Carmarthen, and Rhyd Lafor in the Western Base Section, which played a lesser role in marshaling troops (map 12).

These supply points furnished initial equipment and supplies to camp dispensaries and first aid stations. They also served as resupply points for field hosp tals and other medical units in the area. Small quantities of equipment were made available at these points for units passing through the marshaling area. All embarking troops were provided with motion sickness preventive capsules.

The supply points had several postinvasion responsibilities, including storage and issue of penicillin and whole blood to area field hospitals, hospital carriers, and LST's returning to the Continent after discharge of casualties. Dumps for issue of exchange items were established in the proximity of ports and quays.[33]

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[32] Letter, The Adjutant General to Commanding General, New York Port of Embarkation (attention: Oversea Supply Division); The Quartermaster General (attention: Military Planning Division, Operations Branch); Chief of Transportation (attention: Water Division, Ocean Traffic Branch), 14 Apr. 1944, subject: Additional Tentage for Medical Project No. 5 "SURG" for the European Theater of Operations.

[33] (1) Annual Report, 66th Medical Depot Company, 1944. (2) Medical Department, United States States Army. Blood Program in World War II. Washington: U.S. Government Printing Office, 1964, pp. 531–534.

Map 12.—Supply points in marshaling areas, United Kingdom, May 1944.

ITEMS HAVING SPECIAL SIGNIFICANCE

Although the perplexities in equipping units and fixed installations and in establishing an adequate supply system absorbed the major efforts of the Chief Surgeon's Office and the depots, some individual items, because of their characteristics and importance, required special handling or different procedures. As each item required professional and technical guidance from the consultants to the Chief Surgeon, the procedures varied on the basis of the professional application or item characteristics.

Whole Blood

The Chief Surgeon directed that whole blood for treating casualties would be available at all evacuation echelons down to, and including, division clearing stations and that the shipment of this perishable product would be handled through supply channels.

As a result, the First and Third U.S. Armies were authorized to establish whole blood sections in their medical depot companies and to requisition the necessary equipment and personnel.

Plans provided for maintaining a supply of whole blood at the quays and ports for issue to LST's and hospital carriers for shipment to the Continent as well as for use during the evacuation of casualties.

FIGURE 74.—Whole blood on its way—the first day of the "milk run to the Continent," 14 June 1944.

High priority air shipments of whole blood to the Continent were arranged by G–4, Services of Supply, and 4,000 pounds of critical medical supplies were airlifted to the Continent daily (fig. 74). The medical section of Depot G–45, 3 miles from the airfield at Greenham Common and 38 miles from the ETOUSA Blood Bank at Salisbury, was the receiving and shipping agency. 2d Lt. (later Capt.) Robert E. Pryor, MSC, the officer in charge of air shipments, demonstrated initiative and ingenuity, a major contribution in moving many tons of critical medical supplies to forward areas during the early days of invasion and, later, on the Continent.[34]

Penicillin

In addition to whole blood, the item that had a dramatic impact on the care of casualties was penicillin. Early in 1943, the European theater began receiving small quantities of this antibiotic. A professional controversy ensued

[34] (1) Medical Department, United States Army. Blood Program in World War II. Washington: U.S. Government Printing Office, 1964, p. 479. (2) Memorandum, Brig. Gen. Paul R. Hawley for Commanding General, SOS, 26 Nov. 1943, subject: Provision of Whole Blood for Battle Casualties. (3) Letter, Lt. Col. Richard P. Fisk, Asst. Adjutant General, to Commanding General, First U.S. Army Group, 2 Jan. 1944, subject: Provision of Whole Blood for the Medical Service.

because penicillin had not been tested adequately and its potency period and prophylactic and therapeutic actions were not fully known. Moreover, the lack of experience concerning the proper storage and preservation of penicillin created some problems. During most of the war, it was stored under refrigeration in the belief that this would lengthen its potency period.

Not until April 1944 was the supply of penicillin ample to meet requirements; in June 1944, authority was granted to medical units to obtain the item through normal requisitioning procedures. General and evacuation hospitals were authorized stock levels of 100 ampules; station and field hospitals, 50 ampules; and dispensaries, 10 ampules. Plans were established for the automatic daily shipment of 3,000 ampules of penicillin to the Continent beginning on D-day. The daily quantity was increased to 5,000 ampules at D+17.

As the production of penicillin was accelerated in the United States, ETOUSA requirements expanded, as evidenced by the quantities received and requisitioned. A total of 3,500 ampules were received in March 1944, which increased to 15,000 during April and to 30,000 in May. Requisitions were submitted to the Zone of Interior for 550,000 ampules for June delivery and 800,000 ampules for July. On D-day requisitions were submitted to the Zone of Interior for 900,000 ampules for August loading and 1 million vials for September loading.

Because of the meager production of penicillin in the United States in its earlier days, close control on its use was necessary. The Chief Surgeon's Office, on 16 September 1943, issued instructions as to storage, issue, and administration of penicillin, limiting its use to three main groups of cases in which the antibiotic was of greatest value. The cases indicated were those in which life was threatened by an overwhelming infection; those which, though not immediately life-endangering, showed symptoms of acute or chronic infection not curable by usual treatment procedures; and cases of chronic gonorrhea that were resistant to sulfanilamide. For the latter group and for chronic diseases not endangering life, outdated penicillin could be used, but should be so noted on clinical records.

The dramatic effect of penicillin had even diplomatic reverberations. A stock level of 200 ampules was established at the medical section of Depot G–50 for issue to allied embassies and missions. This level was reduced later to 20 ampules as the need was not so great as anticipated.[35]

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[35] (1) Informal routing slip, Chief Consultant in Surgery, ETOUSA, to Chief, Professional Service, ETOUSA, 15 Jan. 1944, subject: Attached Report by 2d Lt. R. S. Kribs; and attachment thereto, dated 11 Jan. 1943. (2) Administrative Memorandum No. 97, Office of the Chief Surgeon, ETOUSA, 21 June 1944, subject: Supply of Penicillin. (3) Letter, Col. S. B. Hays, MC, to Col. R. E. Hewitt, MC, Executive Officer, Supply Service, OTSG, 13 May 1944. (4) Informal routing slip, Office of the Chief Surgeon, ETOUSA, Supply Division, to Chief, Professional Service, 23 June 1944, subject: Increase in Requirements of Penicillin. (5) Letter, Col. S. B. Hays, MC, Office of the Chief Surgeon, ETOUSA, to The Surgeon General (attention: Col. [Edward] Reynolds), 6 June 1944, subject: Request for Penicillin. (6) Informal routing slip, Office of the Chief Surgeon, ETOUSA, Supply Division, to Executive Officer, Office of the Chief Surgeon, ETOUSA, 7 June 1944, subject: Penicillin for Diplomatic Demands.

Spectacles

Although Army and Air Forces personnel were issued spectacles to correct visual acuity deficiencies before their deployment from the United States, there remained in the United Kingdom a large and increasing workload for replacement and repair of spectacles.

Optical units of the medical depot companies were consolidated in 1943 into the ETOUSA Base Optical Shop at Blackpool. As the buildup of the invasion forces progressed, the spectacle workload increased until June 1944, when a total of 15,000 pairs of spectacles were fabricated, not including approximately 225 pairs per month of bifocal spectacles procured from Theodore Hamblin, Ltd., in England. A total of 40,400 pairs of spectacles were fabricated in the first 5 months of 1944.

During this period, plans were developed to establish a base optical shop on the Continent and one for each medical depot company designated for continental operations. There was to be a mobile optical repair unit in the base platoon and two portable optical units in each of the advance platoons. Experience by the British in North Africa and Italy and by the Fifth U.S. Army in Italy indicated that facilities for repair and maintenance of spectacles should be provided to the Armies as far as possible, preferably in combat division areas.

The 1st, 11th, 13th, 15th, 30th, 31st, 32d, 33d, and 66th Medical Depot Companies each activated one mobile optical unit, consisting of one officer and six enlisted men and two portable optical units of two enlisted men each. The Base Optical Shop was responsible for determining that optical personnel were adequately trained to function under field conditions and that equipment was ready for operations.[36]

Gas Mask Inserts

Gas mask lens insert fitting cases were stocked by the ETOUSA Base Optical Shop and distributed to station and general hospitals in the United Kingdom designated by the theater chief consultant on ophthalmology to function as centers for fitting of inserts. Personnel requiring lens inserts reported to the nearest fixed hospital with their spectacle prescriptions and their properly fitted lightweight service gas masks for appropriate fittings.[37]

Artificial Eyes

Supply of artificial eyes was another item that required special procedures. During 1943 and early 1944, artificial glass eyes were procured by sub-

[36] (1) ETO Base Optical Shop. [Official record.] (2) Letter, Chester E. Rorie to Dr. Derrick T. Vail, Professor of Ophthalmology, Northwestern University, 3 Apr. 1946. (3) Letter, Capt. C. E. Rorie, SnC, Commanding Officer, ETO Base Optical Shop, to Col. Derrick T. Vail, MC, OTSG, 9 Sept. 1944, with inclosure.

[37] Medical Department, United States Army. Surgery in World War II. Ophthalmology and Otolaryngology. Washington : U.S. Government Printing Office, 1957, p. 117.

mitting requisitions to the British Ministry of Pensions, with patient fittings arranged at the most convenient optical appliance depot.

In 1944, following the development of the acrylic eye, 13 dental officers were trained in fabrication of the eye and then stationed at 13 general hospitals in Great Britain. The material for acrylic eyes was generally procured from the British through reciprocal aid procedures. The Chief Surgeon issued instructions to all medical facilities that artificial eyes would be available in two types: the glass eye, and the acrylic or plastic eye. Instructions indicated that acrylic eyes were preferred and that patients should be transferred as early as possible after enucleation of the eye to the nearest general hospital that had dental officers trained in the construction of acrylic eyes. In 1944, the Base Optical Shop stocked glass eyes and furnished hospitals with an assortment of eyes from which the medical officer could select the color and size for each patient.[38]

Blank Forms

Because the chief of the Medical Supply Division considered it essential to coordinate all requirements for certain basic nonmedical items from other supply services, 2d Lt. (later Capt.) Russell S. Kribs, MAC, was appointed to coordinate blank form requirements with The Adjutant General. These forms, including emergency medical tags which were placed on casualties, clinical records, and laboratory and X-ray report forms, were essential for proper medical care and evacuation of patients.

Having been informed by Lieutenant Kribs that the stock level of forms was seriously low, The Adjutant General transferred the responsibility for these forms to the catalog and equipment list section of the Medical Supply Division. Those forms not available were sought in the Zone of Interior, and small air shipments were made to temporarily sustain the U.K. operation. Local production of forms was imperative although the section's printing capability was concentrated in two borrowed and badly worn Gestetner Mimeograph machines and a small supply of low grade sulfite Mimeograph paper.

A survey of local procurement sources revealed that neither paper nor time was available to print the thousands of forms required to support continental operations. Lieutenant Kribs' appeal to friends in the Quartermaster section elicited four new Gestetners and a limited amount of paper. Through scrounging efforts and trading of two borrowed Gestetners and other less essential equipment for paper, production rapidly reached the U.K. consumption rate, but there were countless complaints about the quality of the printing and the paper.

To improve the quality of the forms and to increase production, a Multilith offset printer was "borrowed" from the Air Forces, and needed plates

[38] (1) See footnote 36(1), p. 303, (2) Medical Department, United States Army. Surgery in World War II. Ophthalmology and Otolaryngology. Washington: U.S. Government Printing Office, 1957, pp. 108–110.

were obtained on a loan basis from the Multigraph Corp. Paper was also obtained from AG Publications in exchange for "machine time."

After shifting of personnel and many minor trials, the initial requirements for medical forms were delivered to the First U.S. Army medical supply officer for distribution 3 days before D-day.[39]

FIRST U.S. ARMY SCHEME OF SUPPLY IN COMBAT

Increase in Supply Levels

The First U.S. Army Surgeon considered the standard equipment lists for field and evacuation hospitals and the tables of equipment for divisional and smaller medical units as insufficient for those units supporting the early assault because of the chance of temporary isolation. With that in mind, certain hospital expendables were increased from a 10-day to a 15-day level and all other medical units in the assault were raised from a 3-day to a 5-day level. Without a counterbalance, the increased weight and cubage would have violated the shipping allocation for tactical hospitals and exceeded the capacity of organic transportation of all other medical units. Every means to reduce weight and cubage was exploited.[40]

Resupply Plans

Resupply plans indicated that from D-day to D+14, 2 days' supply of essential items would be available on the beaches, building up with the various types of maintenance units to 7 days of supply by D+20. In addition, there would be the bulk shipments of critical items on which abnormal consumption rates were expected—litters, blankets, surgical dressings, and other items to be laid down in the LST Army-Navy exchange units. Also, gas casualty maintenance units were to be delivered to the far shore and held in reserve by the 1st Medical Depot Company. If not used, they were to be turned over to Communications Zone depots when the depots arrived on the Continent.[41]

Plans for Operation OVERLORD

All divisional units were to inform the division medical supply officer of their requirements, and he would consolidate divisional requirements and draw in bulk from the nearest Army medical supply installation, for breakdown and reissue to divisional units. Other units were to draw directly from the nearest medical supply points. Requisitioning was to be on an informal basis, and oral requests would be acceptable. During emergencies, units normally would use their own transportation to pick up medical supplies, but would be

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[39] See footnote 16, p. 284.

[40] Report of Operations, First U.S. Army, 6 June 1944–1 August 1944. [Official record]

[41] (1) See footnote 16, p. 284. (2) Larkey, Sanford V.: Administrative and Logistical History of the Medical Service, Communications Zone, ETOUSA, Appendixes 3 and 5. [Official record.]

supported by corps, army, and depot transportation where situations warranted such action.

Medical Department items in need of repair and maintenance were to be turned into the base section of the depot. All generators would be maintained by the Engineer maintenance companies.

Captured enemy medical supplies and documents were to be preserved and reported to the Army medical supply officer, who would receive samples of lots of biologicals and vaccines, for use in the care of prisoners of war and German civilians.

Although the blood detachment was attached to the depot company, it would be based with the major medical unit nearest the servicing airstrip. Deliveries of blood were to be made daily, upon receipt of the blood, based on premapped routes, and in quantities commensurate with the casualty load of each medical unit.[42]

APPROACH OF D-DAY

Except for those depots scheduled for the rearmost phasings, U.K. medical depots had virtually completed the assembly of automatic supply shipments by May 1944. Many prepackaged units of supplies were on their way to southern ports, with some already preloaded aboard ships. By 1 June, the supply points to support embarking troops were established and stocked as preinvasion actions were virtually completed.

General Hawley, in a letter to General Kirk on 3 June 1944, wrote:

> We are all set for the kickoff and I, personally, feel as nervous as players usually feel just prior to the whistle. I have just completed a tour of inspection of all of our field hospitals and evacuation hospitals on beaches and hards and all the transit hospitals which will first receive casualties from overseas. The arrangements are everything that I could desire. You would be very pleased to see the fine mobile units and how they are set up for business. We have just barely squeaked through on our supply situation. I shall not, however, breathe really easily about it for another month.
>
> In a relatively short time, the actions taken by the Surgeon General's Office, with their genesis in the Voorhees mission, had transformed medical supply from an understaffed, floundering system in an untenable position, to a proud and well-integrated organization that could detect its problems, and take the necessary and swift corrective action.[43]

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[42] See footnote 41 (2), p. 305.

[43] Personal letter, Maj. Gen. Paul R. Hawley, to The Surgeon General, 3 June 1944.

CHAPTER X

Europe: Combat Operations on the Continent

MEDICAL SUPPLY SUPPORT ON NORMANDY BEACHES

First Beach Operations

After months of planning and careful preparation, medical supply operations began on the continent of Europe with the landing on D-day (6 June 1944) of the second squad of the first section, 1st Medical Depot Company, in support of elements of the 1st and 29th Infantry Divisions on Omaha Beach. The remainder of the section was unable to land until D+1 because of intense enemy action.

Late on the afternoon of D+1, the first medical maintenance units were laid ashore; however, before these supplies could be relocated, significant portions were lost to the tide. Because of the strong enemy resistance, the first section, Advance Depot Platoon of the 1st Medical Depot Company, was compelled to set up issue points virtually at the high waterline and to use salvaged supplies and reserve stocks.

On the morning of D+2, an advance platoon of the 32d Medical Depot Company, commanded by Maj. (later Lt. Col.) Howard F. White, MSC, landed, and by the afternoon of D+3, the first Army medical supply dump in France was established at Saint-Laurent-sur-Mer, less than a mile from Omaha Beach (fig. 75).

Unlike the situation at Omaha Beach, bulk shipments of medical supplies did not arrive on Utah Beach until D+2, and the first section of the Advance Depot Platoon, 31st Medical Depot Company, arrived ashore on the night of D+2. By D+3, the second section of the Advance Depot Platoon, 1st Medical Depot Company, arrived and took over the beach issue; the remainder of the platoon of the 31st, meanwhile, was setting up the first medical supply dump in the Utah sector near Le Grand Chemin (map 13), 3 miles from Utah Beach in the vicinity of the landing areas for the 82d and 101st Airborne Divisions.[1]

Early Supply Problems

During the first few days, the unloading of medical cargo was irregular, delayed, and confused. One of the biggest problems was locating and gathering medical supply boxes, which were mingled with the mass of other supplies along the beach areas. Use of supplemental methods of resupply, such

[1] (1) Annual Report of Medical Activities, First U.S. Army, 1944. (2) Annual Report, 1st Medical Depot Company, 1944. (3) Annual Report, 32d Medical Depot Company, 1944. (4) Annual Report, 31st Medical Depot Company, 1944.

FIGURE 75.—Medical care on Omaha Beach, June 1944. Note the absence of a litter.

as mortar shell cases, assault vest, and two-man carry maintenance units, averted many emergencies and crises. Block shipments on LST's (landing ships, tank), discharged on the Continent by the Navy as planned, provided a sustaining stock of litters and blankets. In the first 14 days, more than 30,000 litters, 96,000 blankets, and other replenishment items were brought ashore by this means.

Packing lists, which were to be attached to the outside of skid-loaded medical maintenance units, were frequently lost, necessitating opening numerous boxes to locate sufficient quantities of one item to fill a single requisition. By doing this, the waterproofed packing was destroyed, leaving the supplies unprotected from the weather until they could be placed under tentage or other covered storage.

It was planned that hospital ships would deliver the bulk of whole blood during the first few days of the assault to augment LST deliveries and build up a comfortable reserve pending air shipments. It was necessary, however, to interrupt hospital ship schedules until mines could be cleared away. The delay caused concern, particularly on Utah Beach. The first C–47 planes carrying blood arrived at Omaha Beach on D+4; shipments to Utah Beach took place a

MAP 13.—Medical supply depots on the Normandy Beachhead and the Cotentin Peninsula, June-July 1944.

few days later. During late June, the delivery of penicillin also became a problem. Because stocks were waiting to be unloaded from ships immobilized in the English Channel, emergency air shipments had to be sent from the United States to ease the situation.

Transshipment of supplies, including blood and penicillin, between the beaches was virtually impossible.

Hospital assemblies.—One of the most serious problems during the early days was the inability of hospital units to locate and reassemble components of their equipment. To avoid this situation, Maj. (later Lt. Col.) Kenneth E. Richards, MAC, Medical Supply Officer, First U.S. Army, had attempted to arrange for complete hospital assemblies to be loaded on one vessel, each assembly to be accompanied by one officer and five enlisted men of the hospital unit. The decision was that only the initial shipments would receive this kind of protection during transit. As a consequence, hospital personnel spent many futile days going from dump to dump in search of a few more boxes of supplies and equipment that might extend the hospital's functional capability. Maximum functioning of several hospitals was seriously delayed because nearly every unescorted assembly became fragmented.

Emergency requirements.—Despite the confusion and inherent difficulties of war, essential supplies and equipment for medical treatment and evacuation

were delivered to the First U.S. Army. Items in short supply were requisitioned daily from the United Kingdom. The theater Medical Supply Division in Cheltenham maintained a 24-hour duty force, which provided instant action on priority air shipments and those on the Red Ball Coaster system. As early as D+1, emergency shipments of ether and penicillin were dropped by parachute to the medical troops on the beaches. After emergency landing strips became available on D+4, refrigerated whole blood, penicillin, and other critical items were delivered daily.

By the end of June, landing strips had been improved to such an extent that the Combined Air Transport Operations Room increased the load limit for a C–47 plane to 5,000 pounds. The Medical Department was allowed two planes daily, for a total lift of 10,000 pounds. Although this allocation was predicated primarily on transportation requirements for whole blood, the milk run, as it was called, was used extensively for other emergency needs as well.[2]

Visit of the Chief Surgeon.—The Chief Surgeon of the European theater, Maj. Gen. Paul R. Hawley, first visited the Continent on D+5 and returned on subsequent dates to observe the treatment and evacuation of casualties. He was impressed by the organization of the medical service in the First U.S. Army and by the morale of the units. In a communication to The Surgeon General, Maj. Gen. Norman T. Kirk, on 26 June 1944, General Hawley reported:

> Supply has been superb! At every medical unit I visited, from the collecting station to the holding hospital at the evacuation point in France, I enquired specially as to the status of supply. I did not get a single answer that was not to the effect that they had everything they wanted (which is always more than they need) and in ample quantities.[3]

First U.S. Army Report on Supply Difficulties

On 25 June 1944, Major Richards reported substantially as follows to General Hawley on supply difficulties experienced to that date:

> The use of inferior 2.5 Kilowatt generators which failed to stand around-the-clock operations hampered operation of field and evacuation hospitals until they were finally replaced by larger generators.
>
> The use of leaded gasoline caused failure of gasoline burners, autoclaves, and two-burner stoves, but relief finally came when white gasoline became available.
>
> Improper functioning of flow meters for anesthesia apparatus prompted five to six service calls a day.
>
> X-ray grids and screens were smashed, sterilizer gages were broken, and considerable glassware and bottled items were lost. (The fault, according to Major Richards, rested with those responsible for unloading and handling the supplies.)
>
> A greater necessity for spare parts for X-ray machines, autoclaves, anesthesia apparatus, and other machinery was evidenced.
>
> Because of excessive losses experienced during the D-day landings, there was a continuous shortage of blank forms.
>
> Many items, such as power saws, suction apparatus, anesthesia apparatus, oxygen therapy apparatus, and shock team sets, which were not previously authorized, were needed in a variety of medical units.

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[2] (1) See footnote 1(1), p. 307. (2) Report of Operations, First U.S. Army, 6 June 1944–1 August 1944. [Official record.] (3) Annual Report, Supply Division, Chief Surgeon's Office, ETOUSA, 1944.

[3] Personal Letter, Maj. Gen. Paul R. Hawley, MC, Chief Surgeon, ETOUSA, to Maj. Gen. Norman T. Kirk, The Surgeon General, 26 June 1944.

Major Richards' opinion was that air shipments were more desirable than the Red Ball Express shipments because the supplies could be more readily located upon delivery. He also suggested that the one medical depot per Army should be supplemented with advance platoons as proved by the 31st and 32d Medical Depot Companies during the assault phase.[4]

Appearance of More Deficiencies

Despite steps taken in the United Kingdom to augment unit equipment, more deficiencies emerged. Lack of X-ray film-drying facilities in evacuation hospitals was serious. Also, there was a general insufficiency in all oxygen administering equipment. These and similar items were necessarily requisitioned from the United Kingdom.

Planning for resupply of litters, blankets, and splints—the property exchange items—seemed to be adequate, but suddenly it was found that large quantities of three additional items—pajamas, Levin tubes, and tracheotomy tubes—were being evacuated to the United Kingdom along with patients, without compensating replacements. Heavy air evacuation of casualties caused a serious problem in replacing litters and blankets at forward airfields. Attempts to rectify this condition by the inauguration of weekly replenishment, based on casualties evacuated during the previous week, did not prove entirely satisfactory. The problem at this point was solved largely by furnishing additional aircraft based on specified demands. The shipment of blankets, litters, and other essential items was as high as 550 tons in 1 day.

Constantly changing bed capacities during June 1944 caused some hospitals to turn in unneeded tentage and other equipment while other units were inflated to meet sudden, unanticipated needs.[5]

THE BURGEONING DEPOT SYSTEM

Entrance of Third U.S. Army Units

With the addition of elements of the Third U.S. Army in July 1944, Col. (later Brig. Gen.) John A. Rogers, MC, the First U.S. Army Surgeon, faced the problem of supporting an oversized command made more difficult by the changing tactical situation. To add to the drain upon First U.S. Army stocks, some Third U.S. Army units had lost much of their equipment in transit.

To complement the increased troop strength and support expanding medical operations, additional medical depot companies were arriving to assist those which had participated in the beach phase (map 13). The Advance Depot Platoon of the 32d Medical Depot Company, which had set up storage tents near Colleville shortly after D-day, was joined in setting up a depot at Bricquebec, France, by its base depot platoon which had landed on 20 July.

[4] Memorandum, Maj. Kenneth E. Richards, MAC, Medical Supply Officer, First U.S. Army, to Maj. Gen. Paul R. Hawley, 25 June 1944.

[5] See footnote 1(1), p. 307.

The depot was set up in a large open shed which proved adequate despite heavy rains.

On 23 June, the second advance section of the 33d Medical Depot Company landed on Utah Beach, proceeded to Le Grand Chemin, where it assisted the 1st Medical Depot Company until 12 July, then moved to Chef Du Pont to open the depot.

After working at Chef Du Pont, the section moved on 17 July to La Haye-du-Puits, where it set up a medical dump for supplies arriving from the beaches. A detachment of one officer and 20 enlisted men had been sent to Cherbourg on 3 July to inspect and sort 40 tons of captured German medical supplies.

The Advance Platoon of the 30th Medical Depot Company arrived on Omaha Beach on 30 June 1944; the second advance section established a dump at L'Etard while the first advance section went to Cherbourg. Approximately 50 skid loads of medical property and 100 tons of miscellaneous medical supplies were received in the first few days of operation. This dump, located in the vicinity of Omaha Beach, received supplies discharged from vessels in that area. The dump, taken over by the Advance Platoon of the 31st Medical Depot Company on 10 July and consolidated into Depot M–3 on 1 August, consisted of 300,000 square feet of storage space.

Opening of Supply Depots

Closed storage of medical supplies was first opened at Cherbourg by half of the advance section of the 30th Medical Depot Company in early July, and was designated Depot M–1. Lack of proper equipment to handle heavy property handicapped the operation of the depot, which had become partially operational after the port of Cherbourg was opened on 16 July. This depot was closed on 12 August as the tactical situation warranted a forward move.

Depot M–2 at Chef Du Pont, opened by the recently arrived balance of the 33d Medical Depot Company on 15 July, occupied approximately a half million square feet of open storage space, divided by hedgerows. Some 3,000 square feet of covered storage, however, was achieved by using ward tents. Operation of the dump was taken over by the 13th Medical Depot Company on 24 July, 5 days after its arrival (map 13). Approximately 2,500 tons of medical supplies, including assemblies for five general hospitals, had been handled by the 33d.[6]

Position of Advance Section

From D-day to the establishment of the Army rear boundaries on 1 August, the First U.S. Army controlled all supplies and dumps. On 18 July,

[6] (1) See footnotes 1(4), p. 307; and 2(2), p. 310. (2) Annual Report, 30th Medical Depot Company, 1944. (3) Annual Report, 33d Medical Depot Company, 1944. (4) Annual Report, 13th Medical Depot Company, 1944.

however, following a conference attended by the Surgeon, First U.S. Army, and his medical supply officer, and by Col. Charles H. Beasley, MC, Surgeon, ADSEC (Advance Section), Communications Zone, and his medical supply officer, Maj. (later Lt. Col.) Thomas A. Carilia, MSC, it was agreed that the ADSEC Surgeon would be responsible for receiving medical supplies discharged at the port of Cherbourg and over Utah and Omaha Beaches and for operating medical dumps. The three dumps (M–1, M–2, M–3) had a total of 2,875 tons of supplies, 25 percent of which were hospital assemblies.

The First U.S. Army's massive attack on Saint-Lô and adjoining areas started on 11 July. Augmented by attached Third U.S. Army units, a steady pressure was maintained until the German lines collapsed at the end of the month. The Third U.S. Army became operational on 1 August, and the entire front became fluid, the First and Third U.S. Armies advancing rapidly. At that time, the Third U.S. Army medical units, the 32d and 33d Medical Depot Companies, which had been attached earlier to the First U.S. Army, reverted to Third U.S. Army control.[7]

Establishment of General Hospitals

The 5th and 298th General Hospitals arrived on the Continent on 6 and 17 July, respectively, but the unit assembly for the 5th General Hospital was delayed; so, the assembly for the 127th General Hospital, which had arrived, was used to establish the 5th General Hospital at Carentan (fig. 76). The 298th General Hospital was established at Cherbourg. Both units became operational and were receiving patients on 1 August.

By 31 August, 17 general hospital (1,000-bed) assemblies had reached the Continent, together with 151 medical maintenance units, type A; 49 division assault maintenance units, type D, for medical requirements; 211 division assault units, type D, for surgical requirements; and 35 supplemental D units, plus many tons of other supplies.[8]

SUPPLY DIVISION ON THE CONTINENT

With the extension of liberated territory in early August, an advance section of Headquarters, ETOUSA (European Theater of Operations, U.S. Army), moved to Le Mans, and the forward echelon of ETOUSA Headquarters assumed responsibility for the Normandy area on 14 August. The Chief Surgeon's Office, including the Supply Division, had moved in increments from the United Kingdom to Normandy during July and August. Because of its initial locations near Valognes on the Cherbourg Peninsula, the Supply Division was unable to supervise supply operations closely. The Armies could contact the rear headquarters in Cheltenham for emergency

[7] Annual Report, Medical Section, Third U.S. Army, 1944.

[8] (1) Annual Report, 5th General Hospital, 1944. (2) Annual Report, 298th General Hospital, 1944. (3) See footnote 2(3), p. 310.

FIGURE 76.—Unloading the more than 5,000 items that comprised the medical assembly of the 5th General Hospital at Carentan, France, 24 July 1944.

shipments more easily than they could relay messages through Valognes. The Supply Division maintained only rudimentary central stock control records, duplicating to a degree those maintained in the United Kingdom.

Organization

The division was organized into four branches: Administration and Finance, Depot Technical Control, Stock Control, and an Issue Branch that included Civil Affairs supplies and captured materiel. Division personnel included 25 officers, 60 enlisted men, 4 British civilians, and 3 French civilians, for a total of 92.

Immediately following the liberation of Paris by Allied Forces in early September, the Chief Surgeon's Office moved to that city as part of Headquarters, ETOUSA. With the establishment of General Hawley's office in Paris, the Supply Division was augmented by personnel from the United Kingdom and rapidly assumed close supervision of medical supply operations on the Continent in a manner similar to that instituted in the United Kingdom in March 1944.

Stock control.—Stabilization of the depot system after 1 September permitted the institution of the stock control system used in the United Kingdom.

Depots on the Continent (other than those assigned to armies) submitted stock status reports biweekly to the Supply Division.

Upon receipt, depot reports were rapidly consolidated by the Stock Control Branch on electric accounting machines obtained from the New York Port of Embarkation or from a French firm. From these reports, the theater-wide status of each medical item could be determined.

Use of civilian personnel.—French civilians performed the key-punching operation and were able to convert the numerical data into machine language under the direction of an English-speaking French supervisor. By using couriers to collect depot reports and electric accounting machines to consolidate the data, the Supply Division could maintain a surprisingly current and accurate consolidated supply record. The records depended, however, upon depot inventories and reports of quantities on hand, due-in, and due-out, which were understandably inaccurate during the first few months on the Continent.

Stock Levels

Consolidated stock reports formed the basis for establishing theater levels for each item of supply. Before D-day, the need had been perceived for two separate stock levels to support 125,000 hospital beds and other medical units in the U.K. Base Section and to support the armies and hospitals in the Communications Zone on the Continent. While stock levels were computed on actual troop strength for continental operations, U.K. stock levels were based on bed strength data converted to an artificial troop strength to utilize War Department replacement factors. Moreover, separate levels were computed on those items peculiar to definitive treatment in general hospitals. Establishment of these overlapping stocks proved to be a wise decision. Because of the wide dispersion of medical installations between the United Kingdom and the Continent and the difficulties in discharging cargoes from ships arriving from the United States and the United Kingdom, timely support of the fast-moving armies as well as the hospitals on the Continent and those in the United Kingdom would have been highly improbable.

In mounting Operation OVERLORD, stock levels were computed for the buildup of a 7-day reserve stock on the Continent by D+41 (17 July 1944) and an increase to a 60-day reserve by D+208 (1 January 1945). The theater reorder point was established at 180 days' stock for each item: 15 days' operating stock, 60 days' reserve, and 105 days lagtime (defined as the number of days elapsing from the date a requisition was submitted to the United States until supplies were received in an ETOUSA depot).

Replenishment requisitions were computed and submitted to the New York Port of Embarkation every 2 weeks for each item which had an on-hand and an on-order position below the 180-day level. Theoretically, every item would indicate a stock level of 165 days at each computation and 15 days' stock would be requisitioned. Stock replenishment would be received 105 days later so that the actual stock on hand would fluctuate between 75 and 60 days. In practice,

consumption of individual items oscillated widely as did the actual time required to deliver the replenishment stock. The overall system proved exceptionally effective, and medical supply problems on the Continent would have been minimal had it not been for the transportation difficulties.

As in the United Kingdom before the invasion of France, the Supply Division established stock levels for each depot, depending upon its mission. Replenishment stocks were distributed to each depot directly from ships discharging cargoes at ports of debarkation or by interdepot transfers. Balancing of depot stocks on the Continent was instituted on D+90 (6 September) as the depot system reached a degree of stability.[9]

Local Procurement

Procurement on the Continent differed in policy and procedure from local purchase in the United Kingdom. Theater policy for continental operations provided for the maximum use of local resources when such local procurement would (1) supply items that were in short supply in the United States or in the theater, (2) conserve essential shipping space, (3) satisfy emergency requirements, (4) accrue to the benefit of the United States, or (5) aid in the rehabilitation of the economies of liberated areas.

Because of the scarcity of medical supplies and equipment in liberated countries, a ban was established by Gen. Dwight D. Eisenhower on the purchase by cash or the procurement through reciprocal aid arrangements, except where the indigenous government concurred with a specific request.

Procurement from the French was confined to a few items. Arrangements were made with L'Institut Pasteur for the supply of rabies vaccine as required. The only other items bought in quantity were small cloth bags to hold personal belongings of patients, self-retaining catheters, sacroiliac belts, and lipstick which proved most effective for marking casualties in the field. Because intravenous solutions shipped from the United States required much cargo space, an attempt was made to procure intravenous solutions from the French; lack of appropriate facilities to manufacture sterile products meeting U.S. standards precluded consummation of contract arrangements.

Early in 1945, arrangements were made to procure dental X-ray film and X-ray film sizes 8- by 10-inch and 10- by 12-inch from the Gaevert plant in Belgium. This enabled the theater to return considerable quantities of X-ray film to the United States for reshipment to other theaters where it was critically needed.

Although procurement of British items had been severely curtailed in early 1944, the British continued to furnish special items required on "spot" demands. Insulin, heparin, alkathene tubing, medicinal gases for the U.K. hospital system, dental burs, and some nonstandard items were thus procured.[10]

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[9] See footnote 2(3), p. 310.

[10] Semiannual Report, Supply Division, Office of the Theater Chief Surgeon, ETOUSA, 1 January–30 June 1945.

Control of Depot Operations

Depots were operated on the Continent either by single medical depot companies, sections or elements of depot companies, or by more than one depot company simultaneously. Leapfrogging of depots was essential in maintaining support for the advancing front. Medical supply operations in the United Kingdom were conducted primarily in sections of general depots, whereas, on the Continent, virtually all were medical branch depots. To avoid traffic congestion, medical depot sites on the Continent were seldom located in close proximity to other supply service depots. Except in the early days in Normandy where a limited area was involved and a dearth of facilities made selection easy, choice of depot sites was a constant problem. Many more sites were selected than were ever used. Locating suitable plants paralleling the line of communication was a continuing task, and this was usually in competition with the other supply services. Furthermore, in France and Belgium, only sites which had been occupied by the Germans were available for use without long drawn-out requisitioning procedures.

Dual system of supervision.—Chiefs of the supply services, including medical, were responsible for distributing stock among depots, and for issuing supplies under their cognizance.

This system generally prevailed without any difficulties, except for a short period immediately following the merger of SOLOC (Southern Line of Communications) with ETOUSA. During this interval, the Chief Surgeon was not authorized to contact Depot M–452 at Marseille to direct the shipment of stocks except through the base section surgeon. The exception was quickly eliminated by a directive from the theater G–4.[11]

Medical depot manual.—Because medical depot operations in Normandy were necessarily unsophisticated, the Medical Depot Manual was revised to incorporate the lessons learned from operations in the United Kingdom and the early days on the Continent. While mandatory only for Communications Zone depots, the manual was furnished to the armies to encourage their depots to use such procedures as were considered feasible. With the absorption of SOLOC, the same procedures were instituted in the Southern Zone depots. This resulted in a uniform operation among medical depots, which facilitated shifting of personnel and depots from one point of operation to another and provided effective technical and operational control.[12]

EXPANSION OF DEPOT OPERATIONS ON THE CONTINENT

Mobility of Supply Operations

With the entrance of the Third U.S. Army into the conflict, and the breakout of the Allied armies from the Normandy Beachhead at the beginning of August 1944, depots had to move rapidly to keep up with the combat troops.

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[11] See footnote 10, p. 316.

[12] Medical Depot Manual, Chief Surgeon's Office, ETOUSA, 7 Dec. 1944.

Map 14.—Medical supply depots operating in France and Belgium, August-November 1944.

FIGURE 77.—Advance Platoon, 32d Medical Depot Company, receiving supplies at a new location in France, September 1944.

Following a basic pattern, an advance section of a depot would support the army corps making the main combat effort. The second advance section was generally retained with the base depot until the corps medical units outdistanced their supply. The second section could then leapfrog the first, often serving at the same time as an advance party for movement of the base depot. A second depot company was generally strategically situated with one section supporting the most distant flank. Advance sections could move quickly, with trucks shuttling equipment and stocks sufficient for 5 to 10 days' requirements.[13]

Depot Advance to the Siegfried Line

As the medical depot attached to the First U.S. Army, the base depot platoon of the 1st Medical Supply Depot followed the movement of the combat situation from Le Molay near the Omaha Beachhead on 28 June 1944, stopping to set up a base dump at Saint-Lô on 3 August, and advancing its center of operations to Eupen, Belgium, by 10 September (map 14).

Moving from Bricquebec, where its elements had been united on 20 July, the 32d Medical Depot Company (fig. 77), in keeping with the tactical situa-

[13] See footnote 7, p. 313.

tion, advanced to Fougères on 8 August, and on 14 August, opened a depot at Le Mans in support of the XII, XV, and XX Corps. From there, the company sent out advance sections to Fontainebleau and Dreux before opening an advance medical depot at Verdun on 5 September. This became the Third U.S. Army medical distributing depot and the location of ETOUSA Blood Bank until 23 November.

Like the 32d, the 33d Medical Depot Company moved rapidly with the advance of the Third U.S. Army. After its arrival on Omaha Beach on 11 July, the base section helped its advance section in operating Depot M–2 at Chef Du Pont, the first Communications Zone medical depot set up on the Continent in support of the Normandy Campaign. By 29 July, the base section had advanced to Besneville, remaining there until 10 August, then moved rapidly across France to Toul, where it remained in operation until 17 December. The second advance section of the 33d, which had arrived earlier on the Continent and had operated at Le Grand Chemin, Chef Du Pont, and La Haye-du-Puits, moved to Coutances, where it remained until 15 August, then was transferred to Rostrenen, Brittany, and placed under the command of the Ninth U.S. Army to aid in the liberation of Brest.

The 30th and 31st Medical Depot Companies, unlike those previously mentioned, were assigned to ADSEC upon their arrival in France.

After the advance sections of the 30th Medical Depot Company had operated a medical dump at L'Etard and established Depot M–1 at Cherbourg on 9 July, the base section arrived and was assigned to Depot M–2 (later M–402) at Chef Du Pont to establish and operate that depot. Sending out advance platoons to Rennes, where Depot M–404 was established on 20 August and to Le Mans where Depot M–405 set up, the 30th began its move from the Cotentin Peninsula.

By 27 August, it became necessary to establish an advance dump at Chartres, where, for more than a month, Depot M–406T operated against difficult odds.

The 31st Medical Depot Company, similarly assigned to ADSEC, united at Trévières on 1 August after the advance section had operated dumps on Omaha Beach since D+3. First called Depot M–3 and later designated M–403, this depot remained under the control of the 31st until 15 September, shipping as much as 3,500 tons of medical supplies a week.

As the combat forces liberated Paris in early September 1944, the 31st sent an advance platoon into the city to set up Depot M–407. By 25 September, the depot was operational.

The 11th Medical Depot Company, which did not arrive on the Continent until 20 August, opened Depot M–404 at Rennes 4 days later. The depot company remained at this location until October. As part of its duties, a detachment of 15 enlisted men and 1 officer was sent to Brest on 21 September to salvage captured German medical supplies and equipment.

After the departure of the 33d Medical Depot Company from Chef Du Pont on 26 July, the 13th Medical Depot Company was made solely responsi-

ble for the operation of the depot, handling 34,000 tons of maintenance supplies and 800 tons of TOE (table of organization and equipment) equipment. When the 66th Medical Depot Company arrived on 12 September to assume command of Depot M–402T, the 13th moved to Reims, where it set up Depot M–408T.[14]

Early Supply Problems

Two outstanding problems severely handicapped medical supply operations during the first 90 days on the Continent: lack of available transportation and lack of adequate storage space in the depot areas.

Port facilities.—Among the more difficult problems, the lack of ports was one of the most serious. Because deepwater ports did not become available as soon as planned, many ships from the United States which were destined for continental ports were diverted to the United Kingdom and unloaded; the supplies were then placed in depot stocks, from which they had to be ordered forward for movement to the Continent by small cross-Channel coasters. Conversely, some ships scheduled for U.K. discharge were moved, after considerable delay, to the Continent, where they discharged their cargoes over the beaches. The labor expended in these operations and the delay in arrival of badly needed supplies were overwhelming.

Availability of the port of Le Havre in late September provided some additional facilities. That port could handle, however, only a small percentage of the waterborne volume arriving from the United Kingdom and the United States. Although Allied troops captured Antwerp with its huge port installation intact early in September, the water approaches to Antwerp were not cleared until mid-November and it did not become operational until 28 November.

Delay in discharge of cargo was perhaps even more serious. With the lack of adequate port facilities on the Continent, priority was given to unloading ammunition, fuel, and lubricants. Unfortunately, ships carrying these cargoes rarely carried medical supplies. The 130th General Hospital, for example, was immobilized for 7 weeks because of difficulties in unloading its equipment on the Continent. The unit had disembarked in France on 5 September 1944. Its assembly had been shipped from the U.K. depot on 27 August, but only 94 tons arrived in France in September. The balance of 195 tons was not unloaded until 25 October.

Trucking problems.—Difficulties in trucking medical supplies from the port to the medical depot were another drawback to the expansion of the depot system. As an example, an unusual incident occurred when one truck convoy from Cherbourg, carrying a 1,000-bed general hospital assembly, and a second convoy, originating at Le Havre and also carrying a 1,000-bed general hospital assembly, met each other during the middle of the night at a road junction in the interior of France. There the two convoys were mingled, with the result

[14] (1) See footnotes 1(2) and 1(4), p. 307; and 6(2), 6(3), and 6(4), p. 312. (2) Annual Report, 11th Medical Depot Company, 1944. (3) Annual Report, 66th Medical Depot Company, 1944.

that all the beds arrived at one operating site, while the other site received all the mattresses and pillows. The mixup was detected when the two commanding officers called the Supply Division, ETOUSA, within minutes of each other, to report the discrepancies.

Shipment of unit assemblies was only a part of transportation troubles. Bulk stock movements were not immune. Before the breakthrough at Avranches, distances were short and truck transportation presented no problem, but as armies began to race across France, the situation was reversed.

On 25 August 1944, the famous Red Ball Express began operation. Transportation Corps truck companies, using 2½-ton trucks and operating day and night, hauled supplies from the Normandy Beach areas forward to the armies. The armies submitted daily requisitions, based on tonnage allocations; these were approved and distributed each night to the various technical services for supply action. Trucking companies reported to the appropriate depots to transport the supplies to forward areas. If supplies were not received in a certain number of days, the armies submitted new requisitions. This soon led to serious duplications of requirements, and within 3 weeks, a back-order system had to be established to correct these difficulties.

Under this system, nearly all tonnage was allocated to the armies, and little transportation was available for the buildup of forward Communications Zone depots.

Although the Red Ball Express performed a herculean task in moving supplies, there were many difficulties. Truck drivers were not familiar with local geography and sometimes became lost. When vehicles broke down, they were separated from the convoy and the drivers were sometimes unable to find their destinations.

Transportation expedients.—Difficulties encountered in water and truck transportation often taxed the ingenuity of medical supply personnel. For example, while ships were being loaded at ports in southern England during the assault, alert medical supply officers observed that ordnance replacement vehicles were being shipped empty from the United Kingdom. Arrangements were made with Ordnance Department representatives to load medical supplies on the trucks and jeeps. Arriving on the Continent, drivers proceeded to the First U.S. Army medical dumps, unloaded their supplies, then delivered the vehicles to an ordnance depot. The movement of medical supplies under this improvised arrangement was substantial enough to attract the attention of G–4 when reports of tonnage moved to the Continent exceeded that allocated to the Medical Department.

A similar arrangement was effected in Normandy when the Ordnance Department had difficulty in moving vehicles to forward depots. Maj. William B. Wagner, MAC, of the Supply Division, was expediting shipments of supplies from the beaches. He arranged to borrow drivers from hospitals and other units in staging areas when medical supplies could be loaded on the vehicles for movement to forward depots. During 3 weeks, in late September

FIGURE 78.—Tank retrievers, borrowed by the commanding officer of the medical depot at Chartres, France, were used to deliver 3,000 tons of medical supplies to Medical Depot M–407 at Paris when normal transportation means failed.

and early October, 564 vehicles were so used to haul 800 tons of supplies from the beaches to forward depots.

Individual arrangements were made with hospitals and other organizations in the Normandy area, which had trucks not being fully utilized, to haul medical supplies to Depot M–407 in Paris (fig. 78). Needless to say, there was no problem in recruiting drivers as they were permitted to remain in Paris for an overnight visit.

A great deal of reliance was placed on moving medical supplies by air. From the first airdrop on D+1, the volume of air shipment increased rapidly; on 17 September, 50 bombers were used to supplement the milk runs which had started on 14 June. With the liberation of Paris in early September 1944, a receiving point was established at Le Bourget Airfield, which then became the terminus of the milk run from the United Kingdom.

FIGURE 79.—Loading a roll of prepacked medical supplies into a 155-mm. shell that was to be fired to isolated American troops when weather conditions precluded airdrop, October 1944.

At Mortain, France, shortly after the Normandy invasion, the most sensational delivery method was successfully employed. A battalion of the 30th Infantry Division was temporarily cut off by a German counterthrust; medical supplies were running low, and enemy antiaircraft fire prevented an accurate airdrop. Urgent calls for medical supplies prompted the decision to fire replenishment supplies in shells. The explosive head was removed from 155-mm. shells and the hollow nose was loaded with essential supplies, including Pentothal sodium (thiopental sodium), ether, and cotton (fig. 79). Some losses were experienced through breakage, but sufficient quantities were delivered to meet the requirements for the period of isolation.[15]

Lack of storage facilities.—Quite as serious as the transportation problem was lack of adequate outdoor storage space, a problem that was accentuated

[15](1) Memorandum, Col. S. B. Hays, MC, to Maj. Gen. Paul R. Hawley, 24 Dec. 1944, subject: Difficulties in Moving Medical Supplies and Equipment. (2) See footnote 2(3), p. 310. (3) Annual Report, Medical Department Activities, 30th Infantry Division, 1944.

by heavy fall rains, which turned the dry fields of July and August into muddy quagmires. Particularly bad was the situation at Depot M–402T at Chef Du Pont and Carentan.

Late in August, news was received at headquarters of the impending arrival of approximately 9,000 tons of medical supplies on six separate ships. It was decided that Depot M–402T, which was set up in an open field, would be the receiving installation for shipments discharged in the Normandy Base area, but that acquisition of additional space would be necessary. After an extensive search for a suitable storage site, an abandoned airstrip, surfaced with steel matting, approximately ¾ of a mile in length and located on the main highway 2 miles east of Carentan, was chosen. Along with it, a few small buildings in the town were acquired for loose issue. Plans were made to warehouse the materiel by medical class on either side of the airstrip; the Corps of Engineers promised crushed stone for entrance and exit approaches, but only meager quantities were delivered. A detachment from the 30th Medical Depot Company was retained and approximately 900 prisoners of war were acquired to augment the 11th Medical Depot Company since materials-handling equipment was not available. Once a vehicle left the road leading into the depot area, it could no longer operate under its own power and two captured German caterpillar tractors had to tow immobilized vehicles (fig. 80).

The six ships arrived with the anticipated cargo, and the next 3 weeks became the most hectic in the history of the 11th Medical Depot Company. The Transportation Corps pressured the port to unload the ships, the port pressured the truck companies to keep the quays clear, and the truck companies pressured the depot to unload and return their vehicles. Soon, the approaches to the airstrip would not sustain anything larger than a 2½-ton truck, and the steel matting eventually would not accommodate even these. For nearly 3 weeks, both sides of the highway were lined with 10-ton trailers for approximately 1 mile, with all interested agencies clamoring for release and movement of the vehicles.

As the stacks of boxes lining the airstrip began to sink deeper into the mud, the strip was abandoned in favor of the fields paralleling the road. A roller conveyor, manned by many prisoners of war, moved the boxes from the stacks on the airfield to vehicles on the sides of the highway. One such conveyor stretched nearly ¾ of a mile to the most distant stacks. In some instances, prisoners of war formed bucket brigades to move the boxes. To supplement the roller conveyors, the depot built heavy-duty skids to be towed by the German tractors. The volume of stock that arrived during this period precluded an orderly tally, and inventory records suffered for several months.

Despite these handicaps, approximately 700 tons of supplies were handled daily during the 3 weeks. Shipments averaged 60 requisitions daily for the 25 local hospitals, various hospital trains, Communications Zone depots, and hospitals in forward areas.[16]

[16] See footnote 14(5), p. 321.

FIGURE 80.—Captured German tractor and heavy-duty skids built by depot personnel from ships' salvage lumber comprised the standard materials-handling equipment for intradepot movements at Medical Depot M–402T, at Carentan, France, after the rains came in the fall of 1944.

FORWARD DEPOTS

The last 3 months of 1944 saw the opening of additional ports, the closing of Utah and Omaha Beaches, the arrival of shipments on the Continent directly from the Zone of Interior, the rehabilitation of rail facilities, and the increasing emphasis on moving stocks to forward depots. These factors, plus a stabilized front bordering on Germany, permitted a buildup of hospitals in the Communications Zone. Depots M–407, M–408T, and M–409, though preceding some of the events, were products of those developments (map 14).

Depots in France

Having established Depot M–407 in Paris in early September, the 31st Medical Depot Company effectively used its 257,000 square feet of storage space despite a lack of materials-handling equipment.

Early in October, the 31st was joined by the 15th Medical Depot Company, which was responsible for handling medical supplies arriving by plane

FIGURE 81.—Bargeloads of medical supplies on the dockside of Medical Depot M–407 being discharged, sorted, and tallied.

from England and for shipping emergency medical supplies to the frontlines. By the end of October, medical supplies were arriving by every conceivable means (fig. 81), and issue operations were mounting proportionately. The second advance section was sent to Rouen on 2 November to operate a distribution point. With the Battle of the Bulge, which started on 16 December, the depot was overwhelmed with work; however, by the end of January 1945, normal operations had resumed.

Depot M–408T, under the command of Maj. (later Lt. Col.) Harry S. Green, MAC, was opened at Reims in mid-September by the 13th Medical Depot Company, and was augmented by a detachment of the 15th Medical Depot Company.

The depot occupied five one-story, platform-height buildings, totaling 129,805 square feet of storage space and approximately 63,000 square feet of open space. Its initial mission was to provide an immediate backup for the 1st Medical Depot Company of the First U.S. Army, the 32d and 33d Medical Depot Companies supporting the Third U.S. Army, and the 28th Medical Depot Company of the Ninth U.S. Army, as well as to open and operate Depot

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FIGURE 82.—Medical Depot M–409, Liége, Belgium, showing railroad spurs with track sidings adjacent to main warehouse.

M–412 in Reims as a Civil Affairs supply depot. The initial receipts at M–408T were slow, the first rail shipment arriving on 25 September.

By mid-December, the depot was supplying the needs of the Third U.S. Army, of 30 general hospitals, 3 station hospitals, 166 miscellaneous units, and 2 airborne divisions. The Battle of the Bulge increased the tempo of activities significantly, and two provisional supply points were set up on the Meuse River line. As the tactical situation became extremely critical, emergency plans were prepared for evacuation of Depot M–408T. In addition to operating Depot M–412, Depot M–408T was stocked with 2,400 separate items comprising 2,215 tons of supplies; hence, it was fortunate that evacuation did not become a necessity.

Depots in Belgium

After performing a special task of classifying, cataloging, and processing five warehouses of captured German medical materiel at Ciney, Belgium, the 66th Medical Depot Company, commanded by Maj. (later Lt. Col.) Charles L. Gilbert, MAC, was assigned to ADSEC to open Depot M–409 at Liége, on 27 October 1944 (fig. 82). The first issues were made on 7 November and, with help from the 165th Medical Battalion, the depot supported the First and

Ninth U.S. Armies and medical installations of ADSEC and Channel Base Section. From 20 November to 31 December, the operational area of Depot M–409 was constantly harassed by V–1 and V–2 bombs launched from Germany.

During this period, it was imperative that supplies be cleared swiftly from the Antwerp docks, prime target of the German bombardment. Depot M–411 was also established at Liége to serve as a sorting point for medical supplies received from Antwerp. While under the operation of the 66th and a section of the 15th Medical Depot Company which had arrived in November from Paris, the depot lost about 100 tons of medical supplies when V–1 bombs twice made direct hits on the sorting points.

Despite the nightly bombardment of V–1 and V–2 bombs, depot personnel at Liége continued operations directly supporting First U.S. Army units during the Battle of the Bulge. To safeguard shipments during the battle, Depot M–411 was moved on 24 December to Noirhat, 20 miles southeast of Brussels, and redesignated M–413 (fig. 83). Under the control of the 15th Medical Depot Company, Depot M–413 operated as a sorting and reconsignment point, with 50,500 square feet of covered storage space and 87,000 square feet of open storage.[17]

Combat Operations of Forward Depots

First U.S. Army depots.—While the large medical depots were being established at Paris, Reims, and Liége, sections of the Advance Depot Platoon, 1st Medical Depot Company, by 6 October, had established advance dumps at Malmédy, Belgium, and Valkenburg, Netherlands, and the base platoon had moved to Dolhain, Belgium, where it opened the base medical dump in a warehouse (map 15).

On 31 October, the advance section at Valkenburg moved forward and established a dump at Bastogne while the section at Malmédy joined the main body at Dolhain.

During the Battle of the Bulge, a detachment of the advance section at Bastogne was moved to Libin, Belgium, leaving three noncommissioned officers and one private at Bastogne to issue supplies to the 101st Airborne Division and attached units during the siege of the city. By 19 December, seven trucks were secured and medical supplies were removed from Bastogne. On 26 December, the first section of the Advance Depot Platoon rejoined the Base Depot Platoon at Dolhain, and the second section established an advance medical dump at Huy, Belgium.

Third U.S. Army depots.—In support of the Third U.S. Army, the 32d Medical Depot Company, which had operated a large depot at Verdun since 8 September, sent an advance section to Aumetz on 7 November to serve XX

[17] (1) See footnotes 1(4), p. 307; 6(4), p. 312; and 14(3), p. 321. (2) Annual Report, 15th Medical Depot Company, 1944.

FIGURE 83.—Materials-handling equipment at Medical Depot M–413, Charleroi, Belgium, January 1945.

Corps. On 24 November, the medical depot at Verdun was closed and a new depot was opened at Metz (fig. 84) in support of the III, VIII, XII, and XX Corps. By 3 December, the advance section joined the main group at Metz, but, on 20 December, reopened the depot at Aumetz to support Third U.S. Army units thrown in to stop the German counteroffensive in the Ardennes (map 16).

The 33d Medical Depot Company, which had advanced its main body to Toul by 20 September, remained there until 15 December, but in early October, the second advance section had established a forward dump at Bastogne after leaving Rostrenen. By 20 October, this section advanced to Valkenburg, replacing the 1st Medical Depot Company and operating the only dump avail-

Map 15.—First U.S. Army medical supply depots in France and Belgium, October-December 1944.

able to the Ninth U.S. Army until late in November. This dump was turned over to an advance section of the 35th Medical Depot Company attached to the Ninth U.S. Army on 22 December, and the advance section of the 33d moved first to Esch, Luxembourg, and then to Longuyon, France, by 26 December.

Meanwhile, the base section of the 33d had left Toul on 15 December and set up a dump at Château-Salins 2 days later. The unit moved on to Longuyon, where it united with the advance section on 30 December.[18]

Seventh U.S. Army depots.—The 7th Medical Depot Company, commanded by Lt. Col. A. J. D. Guenther, MSC, was responsible for supplying the

[18] See footnotes 1(2) and 1(3), p. 307; and 6(3), p. 312.

FIGURE 84.—In December 1944, the 32d Medical Depot Company mobile optical shop moved its operation to more efficient quarters in a building at Metz, France.

Seventh U.S. Army. After landing in southern France on 16 August, this company advanced rapidly up the Rhône River Valley, and reached Épinal by mid-October. There the base section remained until 7 December, when it moved to Sarrebourg, France (maps 8, 9, and 17). On 18 December, the Lunéville depot, no longer in a forward position, was closed and a new depot was opened the following day at Haguenau, France. The tactical situation compelled withdrawal of the section on 27 December. The next day, the Épinal base was reopened.

Supply functions of SOLOC.—In early November 1944, the Communications Zone of the Mediterranean theater passed on to ETOUSA its functions in southern France. On 20 November, SOLOC became responsible for the standard medical services of the Communications Zone and assumed a primary function, the distribution of medical supplies to the Seventh U.S. Army and the First French Army. Lt. Col. Allen Pappas, MAC, was the medical supply officer.

Throughout December 1944, SOLOC and Headquarters, Mediterranean theater, worked closely together to level stocks, to build up a 45-day reserve, and to transfer complete responsibility to SOLOC.

Because of a sudden influx of German POW's (prisoners of war), the need for POW hospitals increased greatly. By 31 December, a total of 3,000 beds in four separate units had been set up and adequately equipped.[19]

[19] (1) Annual Report, 7th Medical Depot Company, 1944. For more detail on the activities of the 7th Medical Depot Company in southern France, see chapter VIII. (2) History of the Medical Section, Headquarters, SOLOC, ETOUSA, 20 November 1944–1 January 1945.

Map 16.—Third U.S. Army medical supply depots, October-December 1944.

Map 17.—Seventh U.S. Army medical supply depots in northern France, 17 October–December 1944.

Ninth U.S. Army depots.—When the Ninth U.S. Army became operational on the Continent on 5 September 1944, it was initially assigned the mission of clearing enemy troops from the Brest Peninsula. The medical supply support for this operation remained based at Rostrenen, with the second advance section of the 33d Medical Depot Company, temporarily detached from the Third U.S. Army. Deliveries of medical supplies were extremely slow because of the emphasis on movements to the east. As a consequence, the buildup to a 14-day level was never attained during the Brest mission. Brest Peninsula was cleared of enemy forces by 20 September, after which Headquarters, Ninth U.S. Army, moved first to Arlon, Belgium, and then to Maastricht, Netherlands. Pending arrival of its own depots, with their hard-to-come-by balanced depot stocks, the Ninth U.S. Army was supported by the second advance section of the 33d Medical Depot Company at Bastogne. Be-

MAP 18.—Ninth U.S. Army depot operations, September-December 1944.

cause of the delay in delivering stocks during the last part of 1944, the advance section of the 33d continued to support Ninth U.S. Army combat operations from its position at Bastogne and later at Valkenburg.

The 28th Medical Depot Company, commanded by Lt. Col. (later Col.) Lyman J. Clark, MAC, and the 35th Medical Depot Company, under Maj. Stanley Darling, MAC, were assigned to the Ninth U.S. Army in October 1944. While the 35th did not join the Ninth U.S. Army until December, the 28th began to issue supplies at Maastricht in mid-November. In preparation for the next phase of the army's operation, the 35th was sited at Heerlen, Netherlands, but was moved to Melveren, Belgium, with the advent of the Battle of the Bulge. At this point, the 35th collected and stored equipment not required by evacuation hospitals to expedite their withdrawal to more strategic positions.

The newly positioned Ninth U.S. Army on the Belgium-Netherlands front was served by a detachment of the 33d Medical Depot Company (Third U.S. Army) at Valkenburg, until 22 December 1944 (map 18). At that time, the first advance section of the 35th Medical Depot Company took over the operation.[20]

[20] (1) See footnote 6(3), p. 312. (2) Annual Report, Medical Section, Ninth U.S. Army, 1944. (3) Annual Report, 35th Medical Depot Company, 1944.

FIGURE 85.—Besieged soldiers collect sorely needed medical supplies which had been airdropped near Bastogne, Belgium, December 1944.

Impact of the Battle of the Bulge.—The German counteroffensive in December 1944 caused two major supply problems: rapid depletion of stocks through equipment losses and accelerated issues, and removal of depot stocks from threatened areas and their relocation in strategic sites at a time when they were most needed.

When the enemy offensive began, the base depot of the 1st Medical Depot Company was located at Dolhain. The first advance section at Bastogne, and the second advance section at Malmédy, were threatened immediately and movement was imperative. The entire stock of the second advance section at Malmédy was evacuated to Huy by trucks infiltrating the area. Movement of the first advance section from Bastogne was not quite so simple. One small contingent necessarily stayed on with a residue of supplies to support combat troops in Bastogne through the siege (fig. 85). The remainder of the advance section commandeered empty ambulances returning to the rear to evacuate as many items of critical supply as possible to Libin. However, even that position was threatened and the section was forced to withdraw to Carlsbourg,

Belgium. Shortly thereafter, First U.S. Army G–4 directed that all major supply installations withdraw to the army rear area. The base section was moved by rail to Basse-Wavre, Belgium, taking with it the optical and maintenance sections, but leaving the blood bank detachment and the first advance section to operate the heavily stocked Dolhain site (map 19).

The early German successes in the Battle of the Bulge caused great concern for the vast quantities of U.S. Army supplies in the forward areas. Not only had advance depots in France, Belgium, and the Netherlands been stocked by transporting supplies from Normandy, Le Havre, and Rouen, but the port of Antwerp, for a few weeks, had been the funnel through which immense quantities of materiel had been poured.

Certain parts of the Geneva Convention agreements were the basis of the recommendations of the Chief Surgeon, ETOUSA, on 22 December 1944, that most medical supplies be destroyed in the event of imminent capture by the enemy. Items such as instruments, penicillin, morphine, microscopes, needles, and dental gold were to be saved if time permitted. Fortunately, the tide of battle changed and the German drive collapsed before higher headquarters had to decide irrevocably to destroy any medical depots.

During the Battle of the Bulge, the need for combat replacements was critical, and physically fit enlisted personnel were reassigned from Communications Zone depot companies as replacements for losses in the line, with reclassified ex-infantrymen assigned to the depots. Some depots lost almost 80 percent of their personnel. The impact, though serious, affected depot operations only temporarily.[21]

RECURRING PROBLEMS OF MEDICAL SUPPLY

During the period from mid-September to 31 December 1944, problems that had earlier plagued the supply program in the European theater recurred, but, for the most part, were solved.

Split Shipments

During the spring and summer of 1944, split shipments were rare because special efforts were made to load each unit assembly on a single ship, but in October this problem reappeared. Ships with portions of assemblies unloaded at different ports, some in the United Kingdom and others on the Continent. Even when all the ships discharged in the United Kingdom, they generally were unloaded at different ports, making it necessary to ship the segments to a depot for reconstitution of the assembly. During October and

[21] (1) See footnote 1(2), p. 307. (2) Memorandum, Maj. Gen. Paul R. Hawley, Chief Surgeon, ETOUSA, for Chief of Staff, ETOUSA, 22 Dec. 1944, subject: Destruction of Medical Supplies to Prevent Capture by the Enemy. (3) Larkey, Sanford V.: Administrative and Logistical History of the Medical Service, Communications Zone, ETOUSA, chapter X. [Official record.] (4) Solinger, Lt. Col. Leo P., MSC, Maj. Gen Silas B. Hays (Ret.), and Col. R. L. Parker, MSC: Combat Support on Continent. A manuscript prepared for a preliminary draft of this volume.

Map 19.—Supply depot movement in the Battle of the Bulge, December 1944.

November, assemblies for 13 general hospitals were involved in split shipments to the United Kingdom. By year-end, none of these had arrived on the Continent.

General Hawley, on 15 December, in a personal letter to General Kirk, reported that hospital assemblies in November were badly split, with one assembly coming in on as many as seven ships. The various parts were supposed to be reunited in a U.K. depot under existing procedure, but this apparently was not being done. General Hawley also protested to the New York and Boston Ports of Embarkation, asking vigorous action to assure loading of each hospital assembly on one ship only. This problem was successfully resolved by corrective action at the ports of embarkation.

The equipment for 44 general hospitals (thirty-eight 1,000-bed, three 1,500-bed, and three 2,000-bed units) and 14 station hospitals (one 750-bed, seven 500-bed, five 250-bed, and one 150-bed units) had been delivered to the hospital sites and the units were in operation by year-end. Continental depots had also assembled and issued thirty-five 500-bed expansion units.

At the close of 1944, assemblies for an additional seven 1,000-bed general hospitals were at the sites, awaiting clearance or completion of plant construction. Of 22 assemblies en route to the Continent from the United States, 11 were in the United Kingdom awaiting shipment across the Channel and 3 were being discharged at continental ports.

Movement of the Unit Assembly

In addition to split shipments, the difficulties experienced in discharging and moving the larger unit assemblies on the Continent were persistent and tormenting, notwithstanding adherence to an exacting operating procedure, which was modified repeatedly to prevent recurrence of the latest mishap. A specific instance is a 500-bed hospital assembly which was aboard ship in the English Channel for several weeks until perseverance by the Supply Division produced a priority for unloading. Around-the-clock offloading over the Cherbourg area beaches had discharged approximately 60 percent of the assembly when a neighboring vessel hit a mine. The vessel discharging the medical assembly ceased unloading operations and sailed for the safety of English ports. Days later, the residue of the assembly was transferred to another ship which docked for discharge at Le Havre instead of Cherbourg. Following several weeks' delay, the two parts of the unit assembly were merged at the hospital site in northern France.[22]

Rail Shipments

By 16 November 1944, the French and Belgian railroads had been rehabilitated, and the Red Ball Express was discontinued. The theater G–4

[22] (1) See footnotes 2(3), p. 310; and 15(1), p. 324. (2) Personal Letter, Maj. Gen. Paul R. Hawley to Maj. Gen. Norman T. Kirk, The Surgeon General, 15 Dec. 1944.

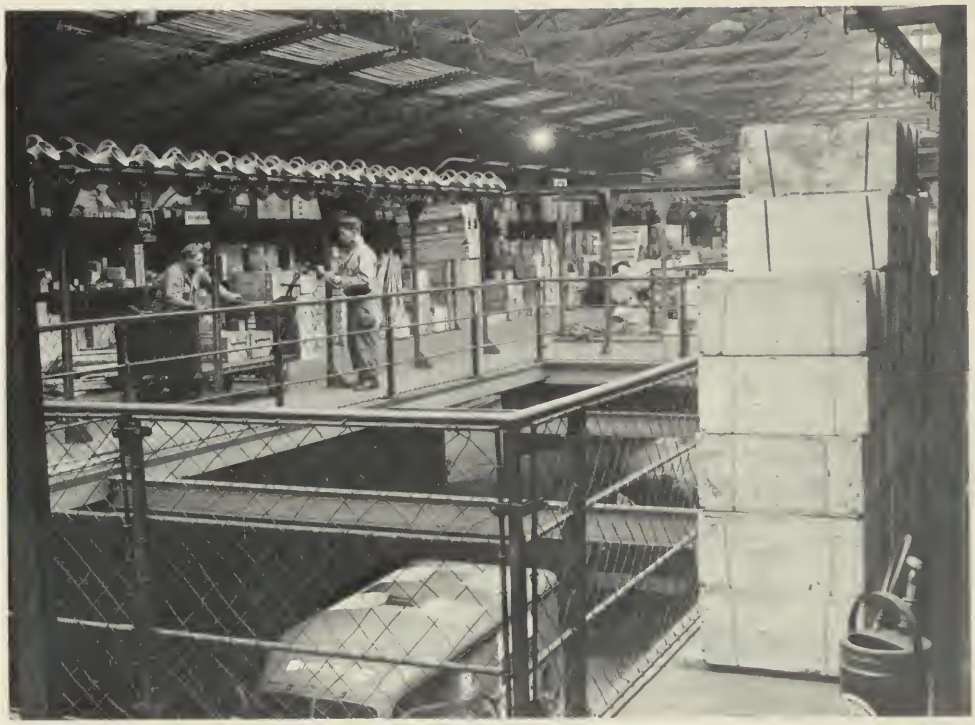

FIGURE 86.—Medical supply points were operated at certain rail stations by the base sections concerned to supply and service hospital trains, such as in this operation at Gare St. Lazare, Paris.

then initiated a system of daily rail tonnage allocations, but because of rail operating difficulties, the Chief of Transportation decided to move only solid trainloads from one siding in Normandy to a forward consignee. G–4 had not allocated to the medical service sufficient tonnage to comprise a solid trainload. As a result, medical stocks were not moved for 12 days, and the allocations did not serve their basic purpose. Not until the medical supply situation became acute was approval given to move solid trainloads of medical stocks from Normany to Depot M–407 in Paris, where individual cars were reconsigned to the armies and to forward depots (fig. 86). In early December, medical supplies began to move forward in volume. Rail shipments then acquired frustrating problems similar to those experienced with Red Ball shipments. Individual cars broke down and were placed on sidings; and cars were misrouted, lost, and, in some instances, disconnected from the rear of the train and the contents pilfered.

Hospital trains were used to move medical supplies forward to the maximum extent possible, but their usefulness was limited since the trains could not be delayed or diverted from their primary mission of evacuating casu-

alties. Movement of supplies by hospital train from Depot M–407 in Paris to Depot M–409 in Liége, where a hospital center was located, proved to be successful.

Air Shipments

Heavy reliance was placed on the air shipment of medical supplies, and the importance of this mode of transportation grew as the war progressed. Obtaining planes to airlift supplies to the forward areas was a problem until a squadron of 20 C–46's, which nobody wanted, was obtained. In 3 months, this squadron transported 30,000 pints of whole blood and 463 tons of other medical supplies, and evacuated 1,168 patients.

The peak of air shipments was reached during the Battle of the Bulge when 150 planes were loaded by the medical section of Depot G–45 in the United Kingdom for airdrops to the encircled troops at Bastogne. By the end of 1944, a total of 61,467 pints of whole blood, approximately 45,000 litters, 426,000 blankets, and innumerable emergency shipments had been moved to the Continent by air. From D-day to V–E Day, more than 10,000 tons of medical supplies were moved within the European theater; this was equivalent to the medical equipment for 49 general hospitals.[23]

Property Exchange Items

In the European theater, as in other theaters, property exchange items were a matter of serious concern and constant trouble. In the very early days of the invasion, many casualties were evacuated to England by LST's which were stocked with exchange items; this meant that the property exchange system could be used and, by exchanging the proper number of items at each end of the cross-Channel run, stocks in the forward elements could be replenished.

Evacuation of patients by air rapidly replaced the use of LST's. Inasmuch as the planes were not stocked with property exchange items, separate supply methods had to be used to move these supplies forward. Difficulties increased as the front advanced to and beyond the German border and as supply lines lengthened. It was frequently necessary to resort to various expedients to supplement the normal supply lines and the property exchange system.

The problem of property exchange items not only concerned internal operation within the European theater, but there was also a constant loss to the Zone of Interior. This was not so serious because 63 percent of the casualties were returned to duty in the European theater, while many others who were litter-and-splint cases originally became ambulatory before being returned to the Zone of Interior. When evacuation was by water as contrasted to air, litters were not necessary and blankets were furnished. To sustain the internal and external pipelines, huge quantities of exchange items were stockpiled in England before the invasion. For example, 300,000 extra blankets

[23] See footnotes 2(3), p. 310; and 15(1), p. 324.

were distributed to U.K. depots. Moreover, substantial quantities of various exchange items, far exceeding established factors, were included on routine requisitions to the Zone of Interior.[24]

MEDICAL MAINTENANCE AND SPARE PARTS

Early Difficulties

Each medical depot company assigned to continental operations included, as a part of its organic capability, a maintenance section to repair Medical Department equipment and an optical section to repair and fabricate spectacles. These two sections usually accompanied the base section and headquarters platoon and were placed in operation immediately upon arrival on the Continent. These sections were staffed with specialists from the maintenance and optical schools of the St. Louis Medical Depot. In addition to a depot company's third and fourth echelon maintenance capability, each hospital was authorized one or two maintenance technicians for first, second, and third echelon repairs, depending on the hospital's size and the complexity of its equipment. Technicians were never sufficiently plentiful to meet all requirements. Each graduate technician was authorized a specialist's repair kit, but the scarcity of certain essential components until mid-1944 prevented a complete distribution upon graduation from the school in St. Louis. Not only was there a shortage of technicians, but a number of technicians were temporarily without kits.

To cope with the dual shortage, available technicians with kits were concentrated in the depot maintenance sections of selected hospitals operating in the United Kingdom and in hospitals phased onto the Continent. Technicians and kits, as they became available in the theater, were furnished to the hospitals.

Reports from France during the first few days after D-day indicated that repair and maintenance was a persistent problem. Principal problems involved equipment damage suffered in transit or abnormal incidents of mechanical breakdowns of apparatus used in around-the-clock operation. As a result of this combination, a more elaborate maintenance and repair setup was needed than had been contemplated.

Maintenance requirements constantly exceeded the authorized capability in ETOUSA. The gap was filled mainly by unit personnel with mechanical aptitude and by skilled POW's. While medical maintenance support within units was outstanding, the major workload fell on depot maintenance sections.

From the moment depot companies arrived in France, the maintenance sections were besieged with work. Affording close support, their men attempted to visit all units to perform periodic checks, to review preventive maintenance measures, and to furnish needed repairs. That approach proved difficult be-

[24] (1) See footnote 21(4), p. 337. (2) Memorandum, Lt. Col. Bryan C. T. Fenton, MC, for Lt. Col. [Leonard H.] Beers, 1 May 1944.

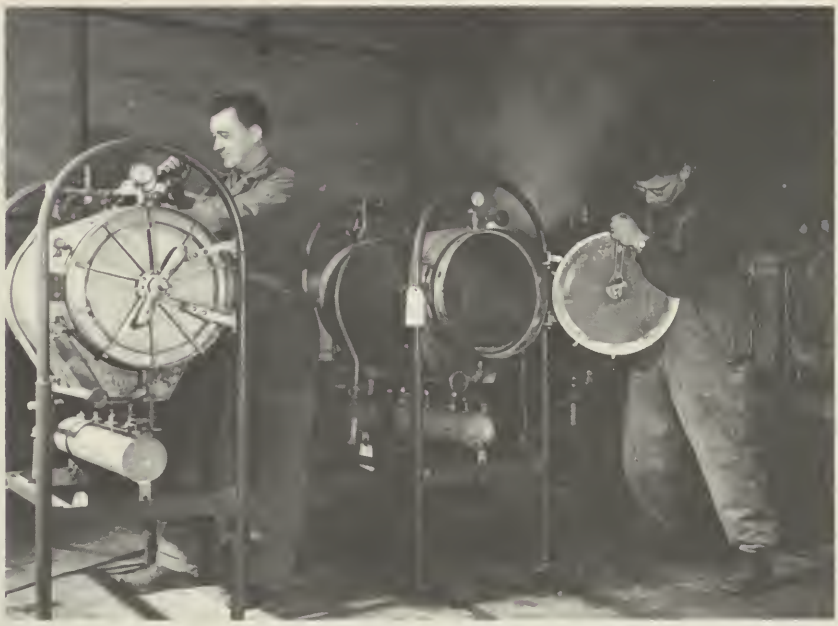

FIGURE 87.—Repairing field autoclaves at the Medical Maintenance and Repair Shop, Depot M–407.

cause of the constant change in unit locations, the inability to effect repair of equipment on site which resulted in a large volume of turn-ins of unserviceable equipment and requisitioning of the necessary replacement item, and the development of a backlog of deadlined material at each depot.

Soon after the invasion, maintenance personnel were faced with repairing technical equipment of foreign manufacture. Major breakdowns were impossible to repair unless the required parts could be fabricated or cannibalized. Maintenance personnel were extremely ingenious and capable, and returned much of this equipment to use.

Except for the high-mortality spare parts packed with unit equipment and stocked by the depot maintenance sections phased-in during the early landings, prescheduled shipments to the Continent did not include spare parts. They had to be requisitioned as required.

After Communications Zone stock control had been established on the Continent, spare parts continued to be a prob'em. Many of the less rapidly moving items were stocked only in one key depot in the United Kingdom, and one on the Continent. Moreover, units lacked the ability to adequately identify all of the required spare parts on their requisitions. This situation was improved with the publication of a theater spare parts catalog by the base maintenance shop at Depot M–407 early in 1945 (fig. 87).

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Base Maintenance Shop

To increase the maintenance capability, an advance medical maintenance and repair unit was transported to the Continent on 14 August 1944, and attached to the 13th Medical Depot Company to set up a fourth and fifth echelon repair section at Depot M–2 (later M–402). The unit consisted of 2 officers and 10 enlisted men, all qualified technicians from Medical Maintenance Depot M–400 in the United Kingdom. Shortly after the establishment of Depot M–405 at Le Mans, the maintenance and repair unit was moved to that installation and it became the supply source for repair parts, buttressed by Depot M–400 in the United Kingdom. Following its relocation with Depot M–407 at Paris, the unit was redesignated the Medical Maintenance and Repair Shop, Depot M–407, on 12 October 1944, and became the key depot for spare parts on the Continent.

The 13th was soon operating a mobile machine shop (truck machine shop M–4) to repair, weld, install, and service generally all damaged X-ray, anesthesia, and similar medical equipment returned by combat units or other medical depot companies. Additionally, the unit inaugurated a mobile third, fourth, and fifth echelon spare parts replacement dump (spare parts truck, M–2) to service forward depot maintenance sections, including Advance Section, Armies, and Ninth Air Force Service Command. Two maintenance teams of two men each, with portable maintenance equipment, serviced hospitals in the vicinity of Depot M–407 and assisted maintenance sections of medical depot companies in forward areas.[25]

Fabrication of Spectacles

The two-man team assigned to the Advance Platoon, 31st Medical Depot Company, set up its portable optical fabrication equipment on D+3 and began to repair and fabricate spectacles. On D+14, a mobile optical unit was set up. By the end of June 1944, these units had repaired or replaced 1,250 pairs of glasses. By February 1945, 54 portable optical units were in use throughout the theater. Furnished with jeeps, they were placed in direct support of combat forces as well as being used, when possible, at general hospitals and medical depots.

From D-day until October 1944, the fabrication of spectacles, which was beyond the capability of mobile units, was accomplished by the ETOUSA Base Optical Shop located in Blackpool, England. As depots were moved to forward areas, it was necessary to activate a similar installation on the Continent. In October 1944, a base optical shop, commanded by Capt. Chester E. Rorie, MAC, was established at the 7th General Dispensary on Rue Helder in Paris. Personnel were assigned from the 31st Medical Depot Company, aug-

[25] (1) For more detail, see chapter IV. (2) Informal routing slip, Col. [S. B.] Hays to Chief Surgeon, ETOUSA, 26 June 1944, subject: Shortage of Spare Parts and Maintenance of Medical Equipment on Far Shore. (3) See footnotes 6(4), p. 312; and 10, p. 316.

mented by the optical section of the 15th Medical Depot Company. The shop moved in January 1945 to larger quarters, at which time the optical section of the 11th Medical Depot Company was added to the staff (fig. 88).

The base optical shop supplied mobile optical units on the Continent, established levels of supply for all echelons of optical repair, compiled theater optical supply requirements, filled prescriptions beyond the capability of mobile units, issued optical equipment, and filled prescriptions for spectacles needed in the local area (fig. 89).

The value of the optical program in terms of conserving fighting strength was extremely high. The field armies placed portable units in the division area so that combat soldiers whose spectacles were lost or damaged usually were back on duty with a minimum loss of time. The optical program as executed in the European theater prevented the evacuation of thousands of individuals each month.[26]

INNOVATIONS IN SUPPLY TECHNIQUE

Requisitions

Shortly after their arrival on the Continent, many units were traveling long distances to the medical depots for supplies. Prevailing depot procedures and workload dictated that units submit requisitions, then return a day or so later to pick up the supplies. Seeking ways and means to process requisitions while the customer waited, the 32d Medical Depot Company discovered that more than 95 percent of the requisitions involved the same 250 fast-moving items. This led to a procedure that opened with a 10-minute visual edit by a well-qualified noncommissioned officer, who was fully cognizant of the supply position of the 250 fast-moving items. When the supply of a fast-moving item was limited, the noncommissioned officer rationed the available supply to make certain that equitable distribution would be effected. Following the edit, one copy of the requisition was immediately sent to the warehouse for selecting bulk supplies while a second copy was sent to the Loose Issue Section for selecting less than case lots. Upon completion of the selection of stock, the requisitions were compared to make certain that all supply action had been effected and that information was posted to both copies of the requisition. One copy was released to the requisitioner for his voucher file, and he returned to his parent unit with the available materiel. The second copy was forwarded to the depot stock record account for "post-posting" action. Depot records were necessarily brought up to date during the late evening hours and no loss of control was experienced.

This procedure permitted rapid supply action, saved unnecessary trips to the depot by consuming units, and was widely hailed by command and staff elements and the using agencies of the Third U.S. Army. It was pointed out

[26] (1) See footnote 1(4), p. 307. (2) ETO Base Optical Shop. [Official record.]

FIGURE 88.—Fabricating spectacles at the base optical shop, Paris, February 1945.

FIGURE 89.—Mobile repair teams serviced all forward medical installations, repairing equipment and issuing critical spare parts from their spare parts truck.

that, in support of a fast-moving field army, few organizations carried more supplies than they actually required and if the requisition item was in stock in the depot, it was issued.

Storage of Supplies

The storage sections of the depots were organized under three warehouse foremen: medical class 1 (drugs) was under one foreman, classes 2 through 6 under a second foreman, and classes 7 through 9, under the third foreman. This was particularly desirable where storage was scattered through a number of small buildings, especially during winter months when responsibility for around-the-clock heating could be placed on one individual. Moreover, this fixed responsibility enabled the personnel to gain familiarity with the stock and to derive added benefits from daily visual checks. Stock locator cards were maintained although the personnel were usually familiar with stock locations.

Prosthetics Laboratories

In addition to dental prosthetic devices, the laboratory attached to the 32d Medical Depot Company fabricated many ear plugs from acrylic resins for issue to personnel assigned to chemical mortar and artillery battalions. The plugs contributed substantially to a reduction of ruptured eardrums and injuries to the inner ear.

Maintenance Sections

Maintenance sections started operation soon after the depots became situated on the Continent. Unserviceable equipment was delivered to the depots by the using organizations, and repair was performed immediately, if possible, or a replacement item was issued to the unit and the unserviceable item was repaired and returned to stock. Where major repair and rebuilding were required, the item was shipped to a Communications Zone depot. Experience soon indicated that there was a definite advantage in having a depot maintenance team, consisting of one officer and two enlisted men, visit all hospital units periodically to inspect preventive maintenance procedures and to make necessary repairs. These visits had the added virtue of permitting maintenance personnel to observe and instruct the using personnel in the correct use and care of the equipment, thereby reducing the volume of major repairs that were required in the early days.

Optical Sections

The optical section in the depot base section was equipped with a mobile optical unit, mounted on a truck. Initially, all operations except mounting and dispensing were performed in the vehicle. It was found expedient, whenever space permitted, to remove the equipment from the truck and set it up in a building. The equipment could be dismantled and set up in the buildings within an hour, and the additional space allowed a more efficient operation. The most persistent problems confronting the optical sections were the improperly prepared prescriptions and the omission of frame sizes.

Blood Bank Detachments

Blood bank detachments were frequently attached to medical depot companies. A blood bank detachment consisted of 1 officer and 22 enlisted men with eight 2½-ton, 6 by 6 trucks, each mounted with a refrigerator, and one truck mounted with a storage refrigerator having a 600-pint capacity.

An advance Army blood bank detachment was attached to the 33d Medical Depot Company on 20 June 1944 for cross-Channel movement and early operations on the Continent. In August, two blood distribution trucks were assigned to the advance section of the 33d Medical Depot Company while it was located at Ducey, France, to service hospital units on the Brittany Peninsula. At that time, 20 percent of all blood furnished to the Third U.S. Army

FIGURE 90.—Whole-blood refrigeration unit installed on a wheeled machinegun mount gave mobility to blood storage.

was being distributed to the VIII Corps sector, which was engaged in clearing the German defenses of the Brittany Peninsula.

An effective means of delivering blood was inaugurated in November 1944. Two blood distribution trucks were used to service each corps zone daily, one carrying blood for evacuation hospitals only, and one for field hospital platoons. After the loss of a driver and truck, presumably captured, the truck destined for field hospital platoons reported daily to the corps medical battalion and picked up a guide, thus assuring prompt delivery. Additionally, each corps medical battalion maintained a level of 30 to 40 pints of blood (fig. 90).

Depot Pharmacies

Recognizing early the need to compound certain pharmaceuticals for divisions and smaller units which were not authorized pharmacists, depot officers unofficially established pharmacies in depots. Registered pharmacists among the assigned personnel welcomed the opportunity to continue their vocation, and the practice gained momentum. Depots accepted prescriptions prepared by medical officers from the various units until the Surgeon's Office, Third U.S. Army, discovered that prescriptions were exceeding the intended capability of some units. Depot pharmacies were temporarily closed until the necessary

controls could be established. The Third U.S. Army Surgeon published a list of authorized preparations, such as ointments, cough remedies, and solutions, which could be drawn from the depots, and on 29 October 1944, the pharmacies were reopened. All other prescriptions had to be approved by the Third U.S. Army Surgeon's Office.

Quartermaster Laundry Sections

Quartermaster laundry sections were often attached to depot companies to launder soiled items, such as pajamas, blankets, surgical drapes, and similar textile items, for depot stock replenishment and to support smaller army medical units. The need to site laundries within buildings and near available water supply sometimes led to locations at a distance from the depots.[27]

SUPPLY ACTIVITIES, UNITED KINGDOM BASE

Base Section Organization

With the movement of Headquarters, ETOUSA, from England to the Continent in July and August 1944, the administration of Communications Zone activities that were to remain in the United Kingdom was assigned to the U.K. Base, which was activated on 1 September 1944. The base section was subdivided into four districts—Eastern, Western, Southern, and Central—comprising nearly the same areas previously designated as U.K. Base Sections.

The U.K. Base Section Surgeon, Col. (later Brig. Gen.) Charles B. Spruit, MC, assumed control of 112 hospitals, consisting of 64 general, 43 station, and 5 field hospitals, and 3 hospital center organizations—more than 130,000 beds in all. Maj. Robert R. Kelly, MC, was designated chief of the Supply Division, which was responsible for the support of activities in the United Kingdom and for bulk supply support of continental operations. Major Kelly was succeeded by Lt. Col. Robert L. Black, PhC, on 1 December 1944.

In supply matters, hospital group commanders had broad authority to control the supply for hospitals (including centers) under their jurisdiction. Their responsibilities were to insure that the approved system of station stock control was in operation, to conduct periodic inspections, and to assist the medical supply officers of each hospital in any supply problems. The organization of these groups assisted considerably in the administration of medical units in the United Kingdom.

United Kingdom Depot System

On 1 September 1944, 16 depots in the United Kingdom were engaged in the medical supply mission, 3 medical branch depots and 13 medical sec-

[27] See footnote 1(3), p. 307.

tions of general depots. One storage depot (M–403) had been closed on 7 July 1944.

With the buildup of continental depots and the deployment of increasing numbers of medical units to the Continent, the mission of U.K. depots focused mainly on the support of the U.K. hospital system. During the period from 1 September to 31 December 1944, the missions of four depots were changed and six medical depot activities were closed. In September, the mission of the medical section of Depot G–22 was changed from distribution to storage, and the depot was closed in the fall of 1944. During October, Depot M–401 and the medical sections of Depots G–14, G–15, G–16, G–40, and G–55, all with storage missions, were closed. In November, the mission of Depot M–410M was changed from distribution to storage. During December, the medical section of G–45 became a distribution depot and that of G–50, a storage depot.

The mission of the medical section of Depot G–30 was to receive British items that had been procured through reciprocal aid arrangements and to provide Medical Department blank forms, medical books, teeth, and special air shipments from the Zone of Interior, and also to receive, store, and issue all United States of America Typhus Commission stocks in the United Kingdom. The Medical Supply Officer, Lt. Col. George T. O'Reilly, MAC, Commanding Officer of the 64th Medical Depot Company which provided the personnel, also served as the medical procurement officer for British procurement. Located in a freight terminal building on Commercial Road in London's East End, Depot G–30 had been subjected to air raids in the early days and to V-bomb attacks after D-day. Part of the depot roof, windows, and the railroad cars in the nearby marshaling yards periodically suffered damage. Depot operations continued in spite of the attacks, with only minor personnel injuries.

Diversion of shipments from continental to U.K. ports because of split assemblies and the nonavailability of ports on the Continent not only delayed their arrival and placed an added workload on the U.K. depots, but increased the load of already overburdened British transportation facilities and interfered with moving desperately needed supplies and equipment to the Continent.

Distribution Mission

Depot closures during the last 4 months of 1944 required a realinement of the distribution areas for depots remaining open. When depot realinement was completed at the end of the year, four depots were servicing 103 hospitals in the United Kingdom (table 5).

In addition to the supply of U.K. hospitals, from 1 September to 31 December 1944, TOE equipment and supplies were distributed to 9 infantry divisions, 3 armored divisions, and 142 other units. Port assemblies were issued to 147 units arriving in the United Kingdom. During the same period, 6,744 long tons of maintenance supplies were received from the Zone of Interior,

TABLE 5.—*Hospitals serviced by medical depots in the United Kingdom, December 1944*

Depot	Number of hospitals	Approximate number of beds
G–18–20	37	49,641
G–23	9	9,964
G–35	37	49,967
G–45	20	23,599
Total	103	133,171

including 1,700 long tons diverted from continental ports. Outgoing shipments to the Continent during this 4-month period were as follows:

Type of shipment	*Long tons shipped*
Bulk shipments	5,977.04
Red Ball shipments	801.95
General hospital assemblies	3,605.53
Coaster shipments (bids submitted by G–4)	2,535.17
Coaster shipments (priority A)	320.30
Air shipments	2,341.64
Total	15,581.63

Depots processed nearly 24,000 requisitions during the period, shipping a total of nearly 894,000 packages while receiving 897,000. Depot stocks on hand approximated 36,000 long tons.

Operations in 1945

As of 1 January 1945, the staff of the Supply Division, Surgeon's Office, U.K. Base, consisted of 15 officers, 25 enlisted men, and 1 Wac. The personnel strength of the nine active U.K. depots numbered 1,321—753 military and 568 others, consisting of civilians, POW's, and Italian service troops (table 6).

During January and February 1945, in addition to supporting U.K. hospitals, depots shipped sixteen 1,000-bed general hospitals and one 250-bed station hospital to the Continent. To assure that the assemblies reached their destination, a security detail of one officer and eight enlisted men from the hospital unit accompanied each assembly from the U.K. depot to the hospital site on the Continent.

Stock levels were constantly revised. On 31 January 1945, they were based on a maximum of 75 days' stock in depots. During the latter part of April, levels were established at a 60-day stockage after they had been reduced three times since the end of January.[28]

[28] (1) Annual Report, Surgeon's Office, United Kingdom Base, 1944. (2) See footnotes 2(3), p. 310; and 21(3), p. 337. (3) Monthly Reports, Surgeon's Office, United Kingdom Base, January, February, and April 1945.

TABLE 6.—*United Kingdom depot status report, 15 January 1945*

Depot	Tonnage on hand (long tons)			Personnel					
	Covered	Open	Total	Military		Civilians	Prisoners of war	Italian service troops	Total
				Officers	Enlisted men				
G–18–20	11, 137	663	11, 800	7	105	28	0	86	226
G–23	2, 250	1, 500	3, 750	4	46	8	50	0	108
G–24	4, 657	3, 826	8, 483	6	56	1	90	0	153
G–30	1, 913	281	2, 194	7	105	23	0	0	135
G–35	2, 964	386	3, 350	9	110	82	50	0	251
G–45	2, 556	625	3, 181	7	143	3	75	0	228
G–50	1, 794	116	1, 910	6	90	22	23	0	141
M–400	565		565	3	38	7	0	0	48
M–410M	700	3	703	1	10	20	0	0	31
Total	28, 536	7, 400	35, 936	50	703	194	288	86	1, 321

SOURCE: Annual Report, Supply Division, Chief Surgeon's Office, ETO USA, 1944, section II, exhibit I.

MEDICAL DEPOT SUPPORT OF THE ADVANCE INTO GERMANY

Depot Support of the Armies

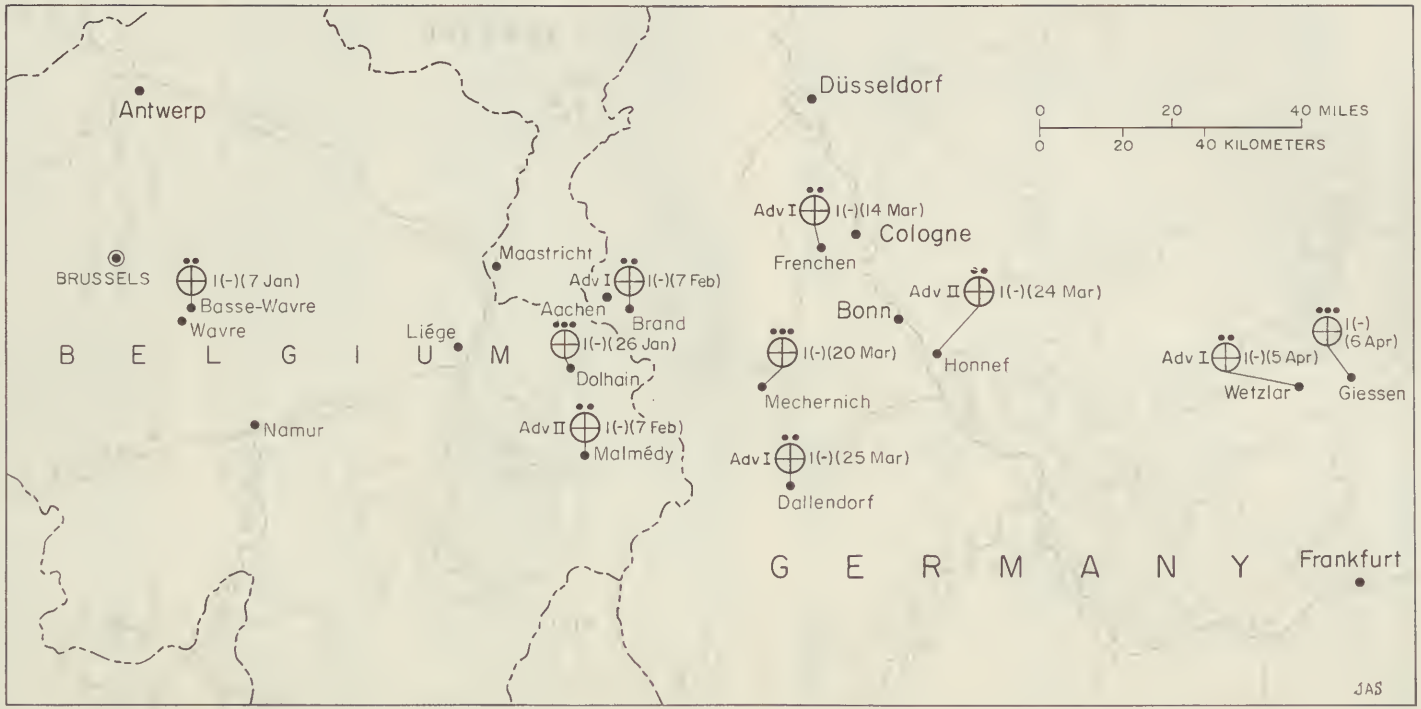
First U.S. Army.—Despite poor weather conditions and the adverse effect of the German counteroffensive in the Ardennes, the Allies renewed their offensive early in January 1945. The First U.S. Army, handicapped greatly by poor roads and a nearly complete destruction of possible storage facilities, was fortunate to be strongly supported by the 1st Medical Depot Company.

Early in January, the base section moved forward to Basse-Wavre from Dolhain, where it had been since mid-December. A month later, the base depot platoon sent out sections to Brand, Germany, and Malmédy, where advance dumps were set up (map 20).

To give close support at the division level, depot sections moved frequently—so frequently at times that it was necessary to obtain clearance from corps and division headquarters before a selected depot site was outdistanced.

By early March, the 1st Medical Depot Company had advance sections moving first into Frenchen, Germany, then Dollendorf, and finally to Honnef, just across the Rhine. The base platoon, meanwhile, was established at Mechernich.

A section of the base platoon was deep inside Germany by April when the supply of exchange items again demanded attention because most casualties leaving the army area were evacuated by air. Normal replenishment channels were too slow, and routine property exchange was circumvented. Consequently, arrangements were made with the Medical Supply Division, Communications Zone, to stock exchange items at the holding units supporting air evacuation points.



Map 20.—First U.S. Army medical supply depots in Belgium and Germany, January-May 1945.

Toward the end of April 1945, the first advance section of the 1st Medical Depot Company, attempting to maintain a supporting position, took advantage of available airlift to move from Dollendorf, Germany, to Wetzlar. For the first time, the rapid advance of depot personnel, equipment, and stock by air was accomplished successfully.

The base platoon of the depot selected a site well forward and moved to Korbach, leaving 200 long tons of excess and slow-moving items to be taken over by ADSEC. To support troops on the left flank, the second section advanced to Duderstadt, Germany, and opened for issue on 16 April. At that time, the supply system appeared to be in a comparatively good position. Envelopment of the Ruhr pocket, however, created a situation that demanded the employment of another advance section.

The first advance section of the 47th Medical Depot Company had been assigned earlier to the First U.S. Army and it was decided to position it at Seigen, Germany, to support the XVIII Corps (map 21). Forty-eight tons of medical supplies, constituting a balanced stock for an advance section, were shipped by air from the United Kingdom and Depot M–407 in Paris to airstrip Y–84, where it was picked up by the section. As the Ruhr pocket was eliminated, the entire stock and the depot section reverted to control of the Fifteenth U.S. Army.

As the First U.S. Army pushed across Germany, supply of hospitals and miscellaneous medical installations for the rapidly surrendering prisoners and large numbers of displaced persons constituted an onerous task. For the most part, captured materiel was sufficient, but quantities of liberated German medical supplies necessitated the establishment of an organization capable of collecting, classifying, and distributing them. The First U.S. Army, operating with only one medical depot company, was compelled to request, and was successful in acquiring, two additional advance depot sections. The first advance sections of the 33d and 35th Medical Depot Companies were attached to the First U.S. Army to establish and maintain issuing points for captured enemy materiel.

A large captured German medical depot at Ihringshausen presented an excellent nucleus for a base issuing depot, and stocks from the collecting points and outlying locations were concentrated there. One hundred long tons of medical supplies were issued from that point during April. A second large German medical depot, equaling in tonnage the one at Ihringshausen, was uncovered at Treuen (map 22). As a result of a conference with representatives of the Chief Surgeon, ETOUSA, the entire stock was evacuated by ADSEC to a central depot under the control of the Third U.S. Army.

With the First U.S. Army ceasing all operations on 9 May 1945, medical supply functions were turned over to the Ninth U.S. Army. This action was preceded by a series of conferences with supply representatives of the

Map 21.—Third U.S. Army medical supply depots in Germany, January–May 1945.

MAP 22.—Captured enemy supply dumps in Germany, February-April 1945.

Surgeon's Offices, First and Ninth U.S. Armies, to fully acquaint the latter with the existing situation and plans.[29]

Third U.S. Army.—While the First U.S. Army was crossing the Rhine River to the north and plunging into the heart of Germany, the Third U.S. Army, supported by the 32d Medical Depot Company, which had been at Metz, crossed the Rhine at Oppenheim and headed northeast (fig. 91). By 21 March, the base section was situated at Saint-Wendel, where it remained until 13 April.

[29] (1) Semiannual Report, 1st Medical Depot Company, 1 January–30 June 1945. (2) Annual Report, Medical Section, First U.S. Army, 1945.

FIGURE 91.—Medics of the 4th Infantry Division, Third U.S. Army, approach a river with an assault boat loaded with medical supplies.

The first and second advance sections had moved forward in late March to Wörrstadt and Frankfurt. The second advance section, after crossing the Rhine and setting up at Hersfeld on 2 April, had advanced by 11 April to Eisenach where it was joined two days later by the base depot. At Eisenach, the 32d employed 40 Serbians and Yugoslavs who had been German slave laborers. These workers stayed with the depot for the remainder of the campaign.

By 25 April, the base depot had moved from Eisenach to Weiden, and finally to Straubing, Germany (map 21), where it remained until its deactivation.[30]

The 33d Medical Depot Company, operating in support of the Third U.S. Army's drive to pinch off the Ardennes salient of the German counteroffensive, was located in January 1945 at Longuyon. After operating a storage area and issue section at Longuyon for nearly a month, one advance section was sent to Bastogne on 27 January to afford closer support for troops in the Ardennes battle. Moving to Ettelbruck, Luxembourg, on 25 February,

[30] Semiannual Report, 32d Medical Depot Company, 1 January–30 June 1945.

Map 23.—Operations of the 33d Medical Depot Company, 1945.

the advance section was joined by the base section on 27 February. By 4 March, an advance section had moved to Bitburg, Germany, and on 23 March, the base depot moved into Germany at Kastellaun. Here, a Military Government supply section was set up on 20 April to handle medical supply of requisitions for displaced persons and civilians. By 30 June, 80 tons of supplies had been received and 477 requisitions were filled.

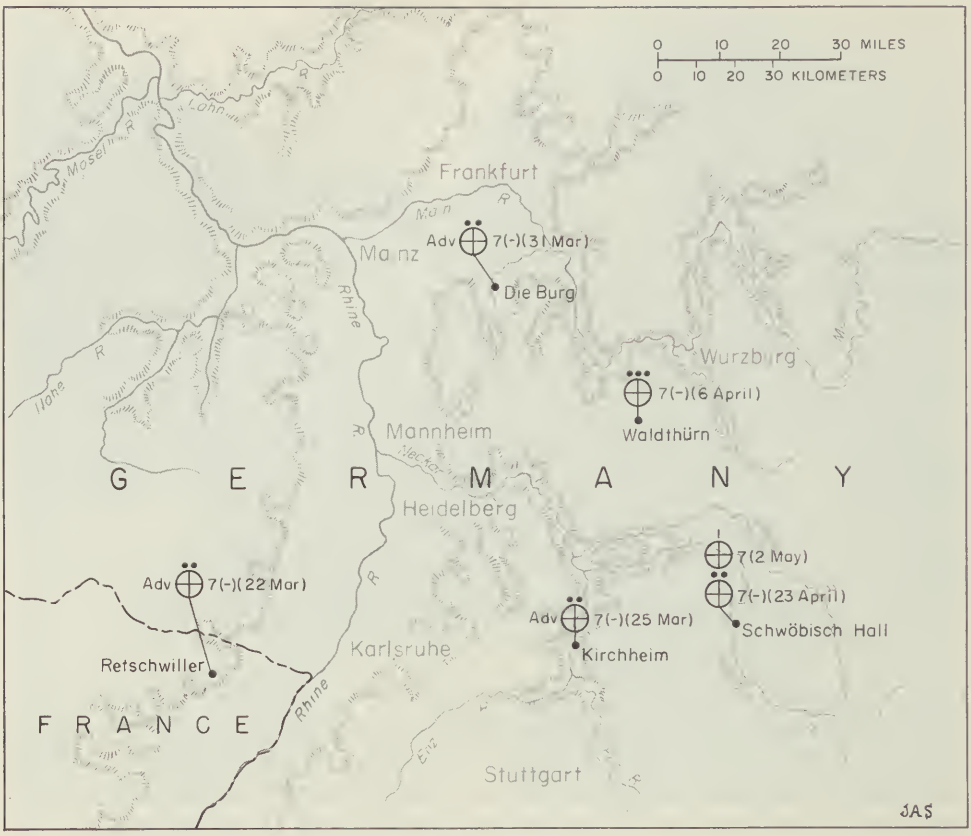
Making its final move of the war, the depot was moved to Furth, Germany, on 28 April 1945 (map 23), where it operated 218,541 square feet of open storage space and 139,623 square feet of closed storage space for 10,952 long tons of supplies.

During its operations in Germany, the 33d had small detachments supervising operations of several captured enemy supply dumps at Trier, Isaar, Oberstein, Mainz, Bingen, Lauterbach, Fulda, Kassel, and Treuen (map 22). Supplies totaling 7,000 tons were consolidated by the 33d.[31]

Seventh U.S. Army.—Having returned to Sarrebourg from Épinal early in January 1945, the 7th Medical Depot Company, with help from the Advance Platoon of the 46th Medical Depot Company, carried the basic medical supply load of the Seventh U.S. Army.

On 12 February 1945, SOLOC was dissolved and its personnel and functions were absorbed by Communications Zone, ETOUSA. As a result of the reorganization, the SOLOC medical section's supply personnel were transferred to the Supply Division of the Chief Surgeon's Office, ETOUSA. Col. Charles F. Shook, MC, was made Deputy Surgeon.

[31] Semiannual Report, 33d Medical Depot Company, 1 January–30 June 1945.



MAP 24.—Seventh U.S. Army medical supply depots in France and Germany, 1945.

With the beginning of the Seventh U.S. Army offensive in March 1945, the 7th Medical Depot Company set up depots at Retschwiller, France, and Kirchheim, Germany. The Seventh U.S. Army's first supply point east of the Rhine River was established at Die Burg, Germany, on 31 March. Following the closing of the main depot at Sarrebourg on 31 March, the base depot was moved to Walthurn, Germany, where it remained until 2 May. At that time, all depot stocks were consolidated at Schwäbisch Hall, Germany (map 24). During the period from 16 August 1944 to 30 June 1945, the 7th Medical Depot Company had processed 20,356 requisitions and issued more than 2,500 tons of supplies in support of a force which grew to nearly 400,000 men.[32]

Ninth U.S. Army.—After moving north into the Netherlands in late 1944, the Ninth U.S. Army had the 28th and 35th Medical Depot Companies for medical supply support.

[32] (1) See footnote 19(1), p. 332. (2) Semiannual Report, 7th Medical Depot Company, 1 January–30 June 1945.

FIGURE 92.—Central supply of the 48th Field Hospital, Friedrichsfeld, Germany, supporting the 30th Division, Ninth U.S. Army, was in turn supported by the 35th Medical Depot Company.

In January 1945, after the collapse of the German counteroffensive, the Ninth U.S. Army engaged in a holding action along the west bank of the Roer River with five divisions. The first advance section of the 35th Medical Depot Company at Valkenburg distributed to the 29th and 102d Infantry Divisions, the 41st and 91st Evacuation Hospitals, and the 1st and 2d Hospitalization Units of the 48th Field Hospital (fig. 92). All other units were supplied by the 28th Medical Depot Company at Maastricht and through a

supply point established near Brand. Several supply points were also established with supply personnel from medical battalions to facilitate the handling of fast-moving items to small units and clearing stations, with requisitioning on an informal basis, oral or written.

The first advance section of the 35th Medical Depot Company, which went to Heerlen in early February 1945, supported XIII Corps units in that vicinity during that month. The first advance section of the 28th Medical Depot Company was located in Aachen, Germany, to supply XIX Corps while its base depot, still at Maastricht, provisioned XVI Corps and the surrounding units during this same period.

Following the Roer crossing, which occurred in bitter cold weather, the depots at Maastricht and Aachen were closed, and the sections of the 28th Medical Depot Company then rejoined to open at Rheydt, Germany, on 5 March, to supply the XIII and XIX Corps units and the Army troops in the vicinity. Over 500 long tons, 260 truckloads, and 29 trailer loads, were transported to Rheydt within 8 days. The first advance section of the 35th Medical Depot Company at Heerlen closed and reopened at Aldekerk, Germany, on 12 March, with part of a blood bank unit to serve XVI Corps and Army units in that vicinity. Meanwhile, the three corps of the Ninth U.S. Army began deploying along the west bank in preparation for crossing the Rhine River.

The crossing of the Rhine River by the Ninth U.S. Army began on 24 March 1945. On 30 March, the first advance section of the 28th Medical Depot was transported in 21 trucks, with 36 tons of supplies, from Rheydt to Dinslakenerbruch to supply troops of the XVI and XIX Corps. Upon completion of the Rhine crossing, the Ninth U.S. Army moved rapidly across Germany until the 113th Cavalry met the Russians at the Elbe River on 30 April 1945. The mopup of German troops was completed rapidly and the depot companies had difficulty in keeping contact with the rapidly moving troop units. The 28th Medical Depot and its sections set up in rapid succession at Dinslakenerbruch, Aldekerk, Bevensen, Drensteinfurt, Helmstedt, Hameln, and Wiedenbrück. The 35th Medical Depot Company, including its advance sections, operated at Aldekerk, Hameln, and Wiedenbrück, as well as in Viersen, Burgdorf, Lüdenscheid, and Ihringshausen. Even with the succession of locations, the depots were unable to maintain supply points within the limitations of depot transportation to provide supply impetus from the rear for some units which were 50 miles distant (map 25).

At the end of April, the 1st Medical Depot Company from the First U.S. Army had joined the Ninth U.S. Army for operation at Korbach, Jena, and Duderstadt in support of the VII, VIII, XIII, XVI, and XIX Corps, which were comprised of 17 infantry and 5 armored divisions, totaling more than 650,000 troops by the end of the war, 9 May 1945.[33]

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[33](1) Semiannual Report, Medical Section, Ninth U.S. Army, 1 January–30 June 1945. (2) See footnote 20(3) p. 335. (3) Organizational Diary, 35th Medical Depot Company, 26 December 1943–3 November 1945.

Map 25.—Ninth and Fifteenth U.S. Army depot operations in northern Europe, 1945.

Fifteenth U.S. Army.—The Fifteenth U.S. Army was the last field army deployed to the European theater, arriving on the Continent on 28 December 1944. Because of the limited scope of its combat operations, it never faced the medical supply problems which beset the other armies.

The initial mission of the Fifteenth U.S. Army was the responsibility for supervising the rehabilitation and reequipping of combat forces withdrawn from action after, and as a result of, the Ardennes offensive. Since the Fifteenth U.S. Army had no depots operational at the time, this involved merely the processing of requisitions to supporting Communications Zone medical depots. During this period, some field and evacuation hospitals arrived from the United States and were assigned to the Fifteenth U.S. Army for training. The Army Surgeon, Col. L. Holmes Ginn, Jr., MC, through his medical supply officer, Maj. Joseph J. Strnad, PhC, took the opportunity to requisition and obtain special hospital allowances of other technical service equipment, such as additional generators, tentage, switchboards, and water purification equipment, which proved invaluable to hospitals in later combat support.

On 1 April 1945, the Fifteenth U.S. Army assumed the defense of the west bank of the Rhine River from Bonn to Neuss and was directed to be prepared to occupy, organize, and govern the Rheinprovinz, Saarland, Pfalz, and that portion west of the Rhine River as the eastward advance of the Allied armies uncovered these areas.

To support this mission, the 47th Medical Depot Company was assigned to the Army and established a base depot at Elsdorf, Germany, during March 1945. With the aid of past experience of other field armies, a balanced stock was issued to the depot, enabling the 47th to render excellent medical supply support to Fifteenth U.S. Army units.

In connection with the Fifteenth U.S. Army's responsibility to handle the delousing of civilians and POW's traveling from east to west, the Chief Surgeon took over the distribution of the necessary dusters and DDT powder. In coordination with Civil Affairs/Military Government, requirements were met for operation of delousing stations along the Rhine.

The immense problem was that of providing medical supply support for approximately 300,000 displaced persons in the Fifteenth U.S. Army area. While the German civilian population had primary responsibility for supplying essential commodities to displaced persons camps, frequent demands for specific medical supply items were met from Civil Affairs/Military Government supply packs issued for this purpose and from captured enemy materiel which had previously been consolidated into the Army medical depot at Elsdorf. Since medical and nursing personnel in displaced persons' camps were familiar with drugs and equipment of German manufacture, the latter practice proved highly successful.[34]

[34] Semiannual Report, Medical Section, Fifteenth U.S. Army, 1 January–30 June 1945.

Operation of Support Depots in the Rear

As the depots supporting the field armies moved into Germany with the troops, several large depots remained in operation in France and Belgium (table 7) and one (M–416T) was opened in Germany (map 26).

TABLE 7.—*Depots on the Continent, 1 November 1944*

Depot	Gross space allocated (sq. ft.)		Net usable space (sq. ft.)		Space occupied (sq. ft.)	
	Covered	Open	Covered	Open	Covered	Open
M–402, Carentan, France	12,000	884,878	9,500	532,891	5,700	238,667
M–405, Le Mans, France	112,694	243,636	70,321	186,074	31,278	2,465
M–407, Paris, France	257,300	17,500	157,600	17,500	85,000	10,000
M–408T, Reims, France	129,805	62,790	64,902	31,395	41,323	3,500
M–409, Liége, Belgium	56,978	12,000	33,132	8,182	4,500	8,182

SOURCE: Annual Report, Supply Division, Chief Surgeon's Office, ETOUSA, 1944, section II, exhibit 4a.

Depot M–402 at Carentan, in early January, was being operated by the 11th Medical Depot Company. On 5 January, the 11th was relieved by the 26th Medical Depot Company, assisted by the 16th Medical Depot Company, which remained until 8 March when it departed for duty at M–407 in Paris. During the early days of 1945, Depot M–402 was consolidated from three separate areas, at Carentan, Chef Du Pont, and a nearby airfield, to two by the closing of the Chef Du Pont open storage area and the redistribution of its stocks. By April, the airstrip was cleared and closed also. With the decrease in depot size and the forward movement of thousands of tons of medical supplies, it was possible to send a detachment of the 26th to Le Mans to relieve the 30th Medical Depot Company in the operation of Depot M–405.

As troop activities in the Le Mans area diminished in February, March, and April 1945, the necessity of keeping Depot M–405 open also lessened. By 20 May 1945, the depot was closed after all area hospitals had built up a 90-day supply level, and the remaining depot supplies were sent forward to Depot M–417 at Elbeuf, France.

Depot M–407 at Paris had rapidly become the largest depot on the Continent—157,600 square feet—and served as a backup point for all forward areas and the key depot for certain selected items. It was operated by the 11th Medical Depot Company, commanded by Lt. Col. Roland H. Iland, MAC. Despite pilferage, the depot used indigenous personnel because of their availability and the problems involved in the control of POW's in a big city.

The large in and out shipments made it necessary to augment the 11th with the Advance Platoon of the 16th Medical Depot Company on 30 January and later, on 9 March, the Headquarters and Base Section, making a total of two medical depot companies serving at Depot M–407. On 25 April, Depot

Map 26.—Rear support depots, Belgium, France, and Germany, 1944–45.

M–407A was established at Trilport, 20 miles east of Paris, in a former mattress factory.

As the receipts and issues of Depot M–407 declined in early May, the Headquarters and Base Platoon of the 16th Medical Depot Company were sent forward to Depot M–418 at Mourmelon-le-Petit, France.

The 13th Medical Depot Company had opened Depot M–408 at Reims in September 1944 and, with the help of detachments of the 15th and 48th Medical Depot Companies, operated this depot until the end of the war.

By 31 January, the effects of having additional ports and improved transportation facilities were evident. In one 10-day period that month, 375 cars of medical supplies were received and processed by Depot M–408T. Thereafter, except for a period in February when roads in the area began to thaw and break up, transportation difficulties subsided and the operation at Depot M–408T became somewhat routine for the balance of the war.

Because of the large number of Communications Zone troops concentrated in the Liége area, Depot M–409 was a consistently heavy operation. The depot was operated exclusively by the 66th Medical Depot Company until 10 March, when the 48th Medical Depot Company arrived at Liége and helped with the operation while training in ETOUSA supply operation before leaving on 9 April for the forward area depot at Duisdorf.

The U.S. Armies were preparing to move forward and it was necessary to establish a depot (M–412) forward of Reims to supply the Third and Seventh U.S. Armies and to handle captured supplies and stocks for the Civil Affairs Division.

Rapidly established in late December 1944, after V–1 bombs forced the abandonment of Depot M–411 at Liége, Depot M–413 at Noirhat served as a sorting and reconsignment point for medical supplies received through the port of Antwerp. Despite being handicapped by poor buildings and lack of roads, the depot, operated by elements of the 11th and 15th Medical Depot Companies, ran smoothly.

Following extensive reconnaissance, a foundry at Foug, France, 4 miles west of Toul was selected as the site for Depot M–414, and a detachment from the 31st Medical Depot Company opened at the new location on 4 February 1945. Although the depot was not as forward as was desired, the Third U.S. Army would not allow Communications Zone depots within its area. This site, however, did favor a number of Communications Zone hospitals in the immediate vicinity. Additionally, Depot M–414 assumed the mission of Depot M–451 at Dijon, which closed on 10 May.

Depot M–417 at Elbeuf came into being unexpectedly. Shipments from the United States started to arrive on the Continent through the Le Havre and Rouen areas without warning in October 1944; they included hospital unit assemblies and bulk medical stocks. With the bulk stocks scheduled for delivery to Depot M–407 and the unit assemblies to be shipped directly to their operational sites, the workload exceeded the port capabilities to segregate the stocks for transshipment. A detachment from the 15th Medical Depot Com-

pany was sent to Rouen in early November to accomplish the sorting. By January 1945, operations had increased to the point that a detachment from the 30th Medical Depot Company was added. As receipts increased, additional space was acquired in an old silk factory at Elbeuf. This site was initially established as the 11th Port Medical Transit Depot on 13 February 1945. With the port receiving shipments around the clock, it was essential that the medical section follow suit, operating with a few medical military personnel serving in a supervisory and administrative capacity while POW's were used extensively. Although this depot originated as a storage and sorting point, G–4 directed that each Supply Service open issue points to serve units in the Rouen vicinity. To meet this requirement, the 239th Medical Supply Team was assigned to the operation, and on 30 March 1945, Depot M–417 was activated with an issue mission area.

The last depot established in France was opened at Mourmelon-le-Petit by the 16th Medical Depot Company in the spring of 1945 and designated Depot M–418. With the anticipated ending of hostilities and the planning for redeployment of equipment to the Pacific area, it was advisable to establish facilities for receiving, sorting, disassembling, and reassembling medical equipment other than hospital assemblies, including all types of kits and chests. None of the existing depots was suitable for such an operation and a site at Mourmelon-le-Petit was selected for the construction of Depot M–418. It was located within the Assembly Area Command, which was being formed to receive and process troops withdrawing from Central Europe.

Depots in southern France.—With the consolidation of SOLOC and Communications Zone, ETOUSA, two medical depots, M–351 at Dijon and M–352 at Marseille, came under the control of the European theater.

The Dijon depot was operated by the 70th and 71st Medical Base Depot Companies in support of the Seventh U.S. Army and the First French Army. With the consolidation, the depot assumed the parallel position of the advance section depots and moved along with the advance of the Seventh U.S. and First French Armies into the Rhine area.

Depot M–352 (later M–452) at Marseille, operated by the 231st Medical Composite Battalion, served as a port, filler, and reserve depot and, later, as an assembly depot. Consisting of 250,000 square feet, this depot was one of the first to use mechanical handling equipment on a large scale.

Depots in Germany.—A site at Weinheim, east of the Rhine River, was selected for Depot M–416T. Although rail service had been reestablished, the site was about 10 miles from the rail line. The 30th Medical Depot Company opened Depot M–416T on 1 May 1945. As the depot was in process of being organized, units began to turn in equipment for redeployment, and the magnitude of receipts made it necessary to augment the depot with a detachment of the 30th Medical Depot Company, which had been assigned to Depot M–417 in Elbeuf since early January 1945.

As the armies drove into Germany, the Medical Department was pressured to select a depot site on the extreme right flank of the Ruhr area. However, Col.

Silas B. Hays, MC, Chief of Supply Division, Chief Surgeon's Office, believed that Depot M–409 at Liége was adequate since any relocation would be temporary because the British were scheduled to take over the area as soon as the Ruhr drive had been completed. A compromise site was selected by ADSEC at Duisdorf, close to Bonn, and on 9 April, the newly arrived 48th Medical Depot Company assumed operation of Depot M–415.[35]

SUPPLY FUNCTIONS IN 1945

Medical Maintenance

By the end of 1944, the medical maintenance program was functioning effectively, and planning was started on the redeployment of equipment to the Pacific theater. On 16 March 1945, the Maintenance and Repair Section of the Supply Division, Chief Surgeon's Office, ETOUSA, was created, and plans were made to reclaim and salvage medical equipment and to locate redeployment maintenance centers. The 317th Medical Service Detachment was moved from Normandy Base (Depot M–402T) to establish a maintenance shop at Depot M–408T at Reims while the 321st Medical Service Detachment was moved from Depot M–407 in Paris to Depot M–409 in Liége to meet the regional redeployment maintenance requirements.

To supplement the 15th Medical Depot Company, medical service detachments were assigned to various depots. The 233d and 235th Medical Service Detachments were assigned to the medical maintenance and repair shop at Depot M–407.

Repair parts were a constant problem until the Chief Surgeon, ETOUSA, inaugurated the system of having a repair parts truck make scheduled visits to the army area. More than 3,500 items were repaired by the army depots' maintenance shops from January to June 1945.

Selected officers and enlisted men from maintenance shops were sent to the tropicalization and fungusproofing course conducted by the Signal School at La Jonchère, France. Attendance at the course was supplemented by 2 days of application at the maintenance and repair shop at Depot M–407. Shortly thereafter, a standing operating procedure for moisture-fungusproofing of Medical Department technical equipment was completed and distributed to all medical maintenance shops on the Continent and in the United Kingdom. Concurrently, serviceability standards for Medical Department technical items were developed for daily operations and for redeployment.

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[35] (1) See footnote 10, p. 316. (2) Annual Report, 15th Medical Depot Company, 1945. (3) Annual Report, 13th Medical Depot Company, 1945. (4) Semiannual Report, 66th Medical Depot Company, January-June 1945. (5) Semiannual Report, 31st Medical Depot Company, January-June 1945. (6) Annual Report, 70th Medical Base Depot Company, 1945. (7) Semiannual Report, 231st Medical Composite Battalion, 1 January–30 June 1945. (8) Annual Report, 30th Medical Depot Company, 1945. (9) Semiannual Report, 48th Medical Depot Company, 1 January–30 June 1945.

Airlifts Into Germany

In January 1945, seven C–47 transports replaced the 20 small C–46's operating out of Paris, and a daily airlift of 17½ tons of medical supplies was established. Frequently, these C–47's were used to pick up supplies in the United Kingdom and deliver them directly to army depots. After the armies crossed the Rhine River, far in advance of Communications Zone depots and in territory where rail transportation had been completely disrupted, C–47's provided the essential means to medical supplies.

Captured German Medical Supplies

Before entering Germany, all captured enemy equipment in the hands of units was turned in to the army medical depots. Those few items which were considered suitable substitutes for U.S. items were placed in open stocks. All other expendable items were turned over to the Civil Affairs Division while nonexpendable items were evacuated to Communications Zone depots.

Although problems allied with captured enemy medical materiel were encountered early in France, the quantities uncovered in Germany surpassed the capacity of the Army depots. Consequently, provisional platoons were organized to classify, process, and effect proper disposition of the materiel. Aside from the volume, scarcity of trained personnel, lack of uniformity in German packing, differences in language, nomenclature, and units of measure hampered identification, inventory, and stock control procedures.

German medical supplies and equipment were found in many places in great quantities in the drive to the Elbe River (fig. 93). At the outset, large quantities were wantonly ransacked and destroyed due to failure to provide proper guards. This oversight was soon corrected. Nine supply dumps to segregate, store, and issue the supplies were established in quick succession. Some supplies, after being sorted and salvaged, were used by U.S. units, and the remaining stocks were turned over to displaced persons centers, German hospitals, military governments for civilian use, and similar agencies.[36]

In Germany, the Third U.S. Army used the personnel of captured medical depots, usually *Wehrmacht* troops, and German civilian employees to operate its own depots, under supervision of a limited number of American military personnel. This staffing was rather significant because POW's, who had been attached to assist in processing captured medical materiel in France, could not be taken into Germany. The prohibition of the use of German prisoners in Germany for augmentation of depot staffs made it necessary to recruit personnel from displaced persons camps and to employ German civilians.[37]

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[36] See footnote 10, p. 316.

[37] Semiannual Report, Medical Section, Third U.S. Army, 1 January–30 June 1945.

FIGURE 93.—In addition to stores of medical supplies captured in the race across Germany, many German medical facilities were overrun, such as this Nazi hospital, April 1945.

Depot Closures in the United Kingdom

Further curtailment of medical depot activities in the United Kingdom was effected in January 1945. After the 36th Station Hospital in northern Ireland was closed on 12 January 1945, action was taken to close Depot M–410M, also in northern Ireland, on 25 March. On 12 February, the 16th Medical Depot Company closed out the medical section of Depot G–50 in preparation for early movement to the Continent. Remaining U.K. depots were operated by four medical depot companies (6th, 63d, 64th, and 65th) and a non-TOE group of 4 officers and 26 enlisted men. This group also operated the U.K. Base Optical Shop under the command of Capt. Joseph B. Handley, MAC.

Increasing pressure to close the depots was exerted on the U.K. Base Section during February 1945 by theater headquarters. On 18 February, a report was submitted to Lt. Gen. John C. H. Lee, Commanding General, Communications Zone, ETOUSA, stating that it would be impossible to contemplate any further reduction of either personnel or installations at that time because of (1) anticipated workloads in the deactivation of hospitals, (2) re-

assembling, repacking, and redeploying of hospital assemblies and depot stocks, and (3) servicing the heavy hospital patient load. As a result, there were no further depot closures until May 1945.

Deactivation of Hospitals

With emphasis on the continental hospital system and the resultant shortening of the evacuation lines, plans were prepared in February 1945 for the phased transfer of U.K. hospital units to the Continent. In all, 21 hospital assemblies were shipped to the Continent.

On 20 March, the Surgeon, U.K. Base, directed that hospital units being closed for movement would turn in equipment to their servicing depot. Unfortunately, when the first few hospitals were closed, distribution depots were engaged in building hospital assemblies for shipment to the Continent. As the uncrated and unpacked supplies from closing hospitals were delivered to depot docks, the resulting confusion necessitated an immediate change of plans; one depot, G–24, was designated to receive the supplies and equipment turned in by hospitals.

The magnitude of the receipts of supplies and equipment from hospital closures required prompt action to establish methods and procedures for sorting, repairing, packing, marking, and shipping the materiel. Approximately one-half of the officers and enlisted maintenance technicians of Depot M–400 were transferred to Depot G–24 to supervise the sorting and repairing of technical equipment.

In May, 10 hospital locations were closed simultaneously on orders of the Surgeon, U.K. Base. Large quantities of supplies and equipment, in all degrees of serviceability, were literally thrown into the depot. Technical equipment was turned in either without accessories or with accessories in unlabeled boxes. Serviceability of this equipment was not indicated, British and American items were not separated, and scrap and salvage were sent to the depot along with technical services equipment. Articles of clothing were not sorted according to size, and combinations to safes were not furnished. These deficiencies resulted from failure to comply with the provisions of the directive. To prevent similar recurrences, Colonel Black, Chief of the Supply Division, met with medical supply officers of approximately 50 hospitals and the various hospital centers at Depot G–24. There, the officers were oriented in the proper method of returning medical supplies and equipment as their hospitals closed. They were conducted through the depot to see at first hand the problems that had been created, and to impress on them the necessity for complying with the directives covering turn-in of supplies. The orientation and series of inspections corrected the major deficiencies in the turn-in of hospital assemblies in May and June 1945. At the same time, additional personnel were secured to assist in receiving materiel at Depot G–24. Medical, surgical, X-ray, and dental technician personnel were obtained on temporary duty assignments to help classify and identify supplies and equipment.

FIGURE 94.—Scarcity of boxes and packing material caused units to use discarded German small arms ammunition boxes to transport medical supplies.

A serious operational problem developed within the depots as packaging and crating lagged behind the sorting process, and large quantities of individual items began to accumulate. Textiles were baled on a 24-hour schedule with the help of POW's, but the backlog of packing and crating continued to mount. Military personnel records were screened for qualified carpenters; 15 so located were put to work promptly, prefabricating boxes and crates. Two sanitary companies were also attached to Depot G–24 to expand operational capacities.

Shortages of various types of packing materials compounded problems. Although one officer in London was constantly attempting to purchase packing and crating material, these items were not available. On one occasion, a plane-load of excelsior was flown from France to enable continuation of the packing operation. Deliveries of packing and crating materials from the Zone of Interior were woefully behind schedule (fig. 94).

Disposition of British Items

As has been mentioned, hospitals in England were equipped with both American and British items. Housekeeping items, such as beds, mattresses, and bedside tables, had been furnished by the British and were to be returned

upon deactivation of the units. Many items of equipment which had been procured from British sources through reciprocal aid arrangements were not considered desirable for shipment to other theaters, or to the United States because of parts peculiarity and different electrical voltages. Consequently, supplies in hospitals were segregated into three categories: British reciprocal aid items which would have to be disposed of as surplus, housekeeping items which were to be returned to the British, and American items which were further categorized as to items in excess of overall American requirements and items which would be required either for redeployment or return to the United States.

Return of housekeeping items presented a rather complex problem because adequate records had not been kept on the items furnished by the British. Further complications were caused by the transfer of many items from one installation to another as necessity demanded. The problem was finally resolved by having the local British barracks officers furnish the U.S. Forces with receipts for all British accommodation stores which were returned. No attempt was made to correlate items turned in against the list of items initially issued.

Disposition of unserviceable items was another problem. The British controlled the salvage operations and were reluctant to accept any items unless they met established salvage criteria. Unserviceable vehicles were not accepted until all wood and rubber were removed. Ordnance had a number of unserviceable ambulances, which were concentrated in a large field, doused liberally with gasoline, lighted, and thereby reduced to the desirable state of metal only.

All hospitals had many open packages of laboratory chemicals and drugs which could not be returned to the depots. Arrangements were made with the British Ministry of Supply to turn such items over to local charities in exchange for a signed release from liability for any error in label or content. Closing hospitals were informed to destroy any open packages whose contents were in doubt.

With the declining distribution and maintenance workload resulting from hospital closures after 1 May 1945, further adjustments were made in the depot system. The repair workload at Depot M–400 had diminished drastically so that it was practical to close the depot on 15 May and to transfer the personnel and equipment to Depot G–45 where a medical maintenance and repair section was established.

On 20 June, Depot G–45 was designated the sole distribution depot in the United Kingdom, thus allowing the medical sections of Depots G–20 and G–35 to begin to close and transfer to Depots G–24 and G–45 stock not required for the assembly programs. On 27 June, Depot G–24 was turned over for the exclusive use of the Medical Department and was redesignated as Depot M–424. On 30 June, Depot G–30 was officially closed and the procurement office was moved to the U.K. Surgeon's Office.

Planning was completed for closure of Depot G–23 on 21 July, and Depots G–20 and G–35 on 31 July. Depot G–45 continued to operate as a distribution depot, including the medical maintenance and repair shop.

Depot M–424 continued its mission as a filler depot and repository of stocks from hospitals and units closing in the United Kingdom, including a program of sorting, classifying, and repacking supplies and equipment. The depot also served as a storage point for surplus property awaiting disposition by the U.K. General Purchasing Agent.[38]

CIVIL AFFAIRS MEDICAL SUPPLY

Preinvasion Planning

Preinvasion planning for Civil Affairs medical supply, under the direction of Col. Stuart G. Smith, MC, conceived of the Supply Division as responsible only for the distribution of Civil Affairs supplies. Requirements were to be determined by SHAEF (Supreme Headquarters, Allied Expeditionary Force) and the Combined Chiefs of Staff, based upon the expected civilian population to be liberated during successive stages of the invasion. These needs were to be satisfied principally in terms of the BMU (basic medical unit), and the assembly of 189 cases containing drugs, dressings, surgical instruments, general practitioner's sets, and layettes. The so-called BMU was capable theoretically of meeting minimum requirements for 30 days for 100,000 civilians in liberated areas and for 1 million civilians in conquered territories when supplemented by various other smaller assemblies, such as basic veterinary units, basic laboratory units, and similar items.

Change in Concept Following Invasion

Although 85 basic units were allocated for distribution during the first 90 days of the invasion, only 5 were actually issued—1 each to Valognes, Coutances, Avranches, Rennes, and Paris. Civilian requirements were satisfied during that period principally by use of indigenous supplies, captured enemy medical supplies at Cherbourg and Isigny, and to some extent, by drawing upon regular U.S. Army stocks.

It became apparent after the breakthrough at Avranches in July 1944 that the whole concept of Civil Affairs medical supply had to be revised because of numerous difficulties. Only in the larger cities, and then only after the battleline had moved far forward, was civilian authority sufficiently reconstituted to accept and distribute an entire unit of supply of such magnitude. The arrival of basic units in France on seven different ships posed the difficult problem of marrying-up the component parts into a whole unit. Transportation was in such short supply that critical items were removed from the units and moved forward while the depleted remains stayed on or near the beach. Enemy materiel had been captured in quantity at no fewer than 14 locations in France, permitting the selection of needed items. Health

[38] See footnotes 10, p. 316; and 28(3), p. 352.

conditions in France and Belgium, moreover, were better than had been anticipated.

Confronted with these factors, yet aware that a hard winter and the advance into Germany lay ahead, the Supply Division, in cooperation with representatives of SHAEF and the 12th Army Group, made a fundamental revision in the Civil Affairs supply concept: Basic medical units and other large assemblies would henceforth be issued only to governmental authority in liberated areas when and as such authority would reassert itself. Captured materiel would be inventoried and prepared for issue at "retail" to refugee camps, POW compounds, Civil Affairs teams, and villages in forward areas, and 10 BMU's would be broken down for issue of component items.

By the end of 1944, French authorities had accepted 23 BMU's for distribution in Paris, Reims, Le Havre, Nantes, Caen, Rennes, Tours, Lille, and Nancy.

Captured Materiel Program

The captured materiel program, however, adapted itself most efficaciously to meeting civilian needs.

Establishment of captured materiel depot.—Since seven warehouses of high quality medical supplies and equipment of French, German, and Italian origin had been uncovered in Reims, it was determined to set up Depot M–412 in that city, both to classify and distribute the materiel captured there and to marshal and collect all other materiel captured west of the Rhine.

To staff the depot, 3 officers and 15 enlisted men of the European Civil Affairs Division were detached from headquarters and one platoon of the 13th Medical Depot Company was placed on temporary duty. From time to time thereafter, personnel familiar with foreign nomenclature were assigned to Depot M–412 on temporary duty ranging from 5 to 60 days.

Captured materiel teams were formed at Depot M–412 to assay all such materiel in northwest Europe. Items which were of high quality and in short supply in regular U.S. Army stocks were transferred to nearby medical depots for issue; items of French or Belgium origin insofar as practicable were delivered to nearby officials of those countries, and the balance was then transferred to Depot M–412.

All of the captured items so collected were identified, inventoried, assigned supply numbers, and cross-referenced with their U.S. counterpart. By mid-winter of 1944, some 3,150 items, including more than 1,000 drugs, were in stock at Depot M–412.

Such efficient use of captured materiel brought numerous commendations from higher authority, including visitors from the War Department. But perhaps the most significant innovation by Depot M–412 in terms of Civil Affairs supply was the so-called Pannier program (fig. 95).

Medical kits devised.—The early campaign had demonstrated the need for balanced, compact units of supply to be used in displaced persons camps

FIGURE 95.—Assembly of Panniers for distribution through Civil Affairs channels was accomplished at Depot M–412.

or in forward areas where distribution of a BMU would have been wasteful and where there were no personnel capable of requisitioning captured materiel selectively. Accordingly, in cooperation with U.S. Public Health and French medical officers, the Supply Division devised separate Civil Affairs drug, dressing, and surgical instrument kits (referred to as Panniers), containing 46, 43, and 18 items, respectively.

Depot M–412 personnel, with the assistance of available prisoners, assembled the items in captured portable trunks or in wicker baskets. Within 45 days, 5,646 kits were assembled and issued to displaced persons camps and Civil Affairs teams. The prudent selection of component items and the portability of the chests brought widespread acclaim for the Pannier program.

As the military operation swept across the Rhine and into Germany in the early months of 1945, French authority was able to accept delivery of 28 additional BMU's, and 400-bed Civil Affairs hospitals were set up in 20 French cities and towns. With the delivery of these units, responsibility for distribution of civilian supplies to our Western Europe Allies substantially came to an end.

Distribution of captured materiel.—When the fighting ended, the Supply

Division took over numerous German medical depots, including the Neuhof salt mine with its 3,200 tons of supplies. Much of the captured materiel was required to service POW enclosures and hospitals and the balance was used, in the main, for displaced persons camps.[39]

Antityphus Supplies in Germany

Although the Quartermaster Corps was nominally in charge of antityphus supplies, the Medical Supply Division through Depot M–412 issued almost 650,000 pounds of DDT and 4,600 hand-dusters and airlifted 40 power-dusters from the United States and the United Kingdom. Thus, Depot M–412 became the nerve center of all antityphus supply activity.

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[39] See footnotes 2(3), p. 310; and 10, p. 316.

CHAPTER XI

Redeployment and Occupation

REDEPLOYMENT PLANNING

Redeployment planning, initiated by War Department directives in 1944 when it seemed that victory in Europe might be a reality by November or December of that year, lost some of its vigor as winter approached, and it became obvious that the war would be prolonged. The plan of Maj. Gen. Paul R. Hawley, Chief Surgeon, ETOUSA (European Theater of Operations, U.S. Army), for closing and redeploying medical units of the theater was reviewed in January 1945, and a new plan was submitted in March. War Department "Troop Basis" manifested the types of units that would be relocated, but selection of the specific medical units was accomplished by the Chief Surgeon.[1]

After V–E Day, 8 May 1945, the plan for redeployment—dividing Army units into occupation troops (category I), transferring troops to another theater (category II), or demobilizing troops in the United States (category III)—presented a new set of supply problems. Before V–E Day, all attention had been focused upon the requisitioning, receipt, storage, and issue of supplies. Redeployment reversed this flow. The changes of function dictated the development of detailed plans and their execution in a relatively short span of time. A conference with all medical depot commanding officers in ETOUSA was held on 6 April 1945. Headquarters, Communications Zone, had promulgated three plans, as follows:

1. The "Basic Plan for Redeployment," covering the general procedures to be followed in redeployment of troops and equipment.

2. POM-RED (Preparation for Oversea Movement-Redeployment), SOP (Standing Operating Procedure) No. 61, comprising detailed instructions for unit commanders whose units were scheduled for redeployment.

3. SPOR (Supplies Preparation for Oversea Redeployment), SOP No. 63, consisting of instructions concerning the movement of supplies and being designed for use by Supply Services headquarters and depots.

Each document underwent several changes.

The basic plan provided that units going directly to the Pacific area would pass through the Assembly Area Command near Reims, France, where

[1] (1) Letter, Maj. Gen. Paul R. Hawley, Chief Surgeon, Headquarters, European Theater of Operations, U.S. Army, to The Surgeon General, 6 Sept. 1944, subject: Movement of Hospital Units and Equipment From the European Theater of Operations to the Pacific Theaters After Cessation of Hostilities. (2) Period Report, Operations Division (Planning Branch), Office of the Chief Surgeon, European Theater of Operations, U.S. Army, 1 Jan.–30 June 1945.

they would draw supplies to eliminate shortages, and pack, mark, document, and ship their own equipment. The first units were scheduled, however, to bypass the Assembly Area Command and were to proceed directly to the staging area at Marseille, France, where the prescribed processing would be performed. Units sent to the Pacific area indirectly and to the United States for strategic reserve were directed to turn in all equipment—except that designated minimal essential equipment—to collecting points stipulated by Supply Services chiefs. This equipment was then shipped to the Pacific area and to the United States, but it was not marked for any specific unit.[2]

MEDICAL SUPPLY ACTIONS

United Kingdom and Northern France

The Supply Division set forth plans to insure that fixed hospitals included the equipment of other services and that all hospital assemblies were stowed in one hold of a single ship. The Chief Surgeon, ETOUSA, sought and was charged with the responsibility of packing, marking, documenting, and shipping hospitals and similar assemblies upon port call.

It was decided to confine, insofar as possible, the packing of general and station hospital assemblies to the United Kingdom because (1) the existing hospitals could be closed out in the United Kingdom more rapidly, and (2) the comparatively short distances permitted the designation of one depot to receive turned-in equipment for reassembling hospitals against the forecast.

General and station hospitals on the Continent were directed to turn in their equipment to the nearest depot.

Each field and each evacuation hospital scheduled for direct shipment would pack its own equipment with the help of the medical supply service. Medical Depots M–409 and M–414, located at Liége, Belgium, and Foug, France, respectively, were designated as collecting points for all field and evacuation hospital assemblies and were responsible for assembling such hospitals destined for direct or reserve shipments.

The units would be directed to turn in all other medical equipment to the designated collecting point, Medical Depot M–418 at Mourmelon-le-Petit, France, where the equipment would be inspected, disassembled, and then completely reprocessed into minor assemblies. Units going directly to the Pacific area would turn in their equipment and draw completely processed assemblies. Units going indirectly would turn in their equipment, except for minimal essential equipment.

While many aspects of the redeployment program followed the prechartered course, a few conditions militated against effective and full execution. The equipment turned in was generally in somewhat better condition than had been anticipated. Approximately 90 percent of the hospital-type equipment

[2] Semiannual Report, Supply Division, Office of the Chief Surgeon, Headquarters, European Theater of Operations, U.S. Army, 1 Jan.–30 June 1945.

FIGURE 96.—Minor assembly processing line at Medical Depot M–418, Mourmelon-le-Petit, France. Medical Department chests are being disassembled preparatory to restocking.

and 75 percent of the field-type equipment received by depots was either serviceable or repairable. Considerable confusion attended the initial efforts in the U.K. hospital program while a heavy flow of field equipment was processed as planned at Depot M–418 with relative ease. Common to both hospital equipment and field equipment were the factor of urgency, the general shortage of packing and crating materials, and the difficulties of various kinds with marking and documenting shipments (fig. 96).

Although requisitions for packing and crating materials had been submitted to the Zone of Interior in January, supplies were not sufficiently plentiful until after 1 July for the full-fledged program. In the interim, it was necessary to proceed with the small quantities of packing material on hand and, consequently, hospitals assembled during May and June were inadequately packaged and protected.

The varied destinations involved in redeployment made it essential that marking instructions be explicitly carried out and that old marking be obliterated. Unexpected difficulty was encountered because of a considerable shifting of, and loss of, depot personnel incident to their own deployment. These same factors occasioned difficulties in the processing of assemblies and the preparation of accurate documentation. The introduction of a newly designed shipping document for redeployment (modeled after the existing War Department shipping document) compounded the problem.

Finally, and fortunately, Japan's surrender on 14 August 1945 instantly altered redeployment activities in ETOUSA, and energies were directed toward intercepting the movements of materiel that was destined for the Pacific area. Most of the medical units and the equipment which was on the way, or had reached the Philippines and the United States by V–J Day, 2 September 1945, had been processed in accordance with the opening phase of the plan through the huge redeployment processing center at Marseille. Perspectives changed also—no one seemed particularly disturbed that the cherished stocks brought into ETOUSA, many as emergency supplies, would not be shipped against the elaborate plans, but would be disposed of as surplus property.[3]

Southern France

A complete readjustment in supply handling in southern France came about with redeployment. Requisitioning supplies from the Zone of Interior was adjusted to meet the change. The forward flow to CONAD (Continental Advance Section) receded and then, with redeployment, reversed its direction. Stocks in warehouses reached their peak at this time and then began to decrease as supplies were poured out to redeploying units.

Packing and processing of supplies for the Far East had first priority. Thus, in April 1945, two officers were sent from the medical depot in Marseille to Paris to attend a course in special procedures for tropical packing and preservation of supplies to be shipped to the Pacific area. Anticipating the end of the war in Europe, base section shipping procedures were modified, and only those materials were sent to the fronts in Europe that would not stand reshipment to the East. Also, the conservation of packing cases and materials began before the German surrender. Delta Base Section established a central boxmaking activity, where various standard-sized boxes and crates were made for use by all technical services. When shipments started, various port battalions entered into loading competitions which reached their peak when V–J Day diverted the flow of materiel.

The Delta Base Section personnel-staging program was rapidly developed to provide facilities to accommodate 200,000 troops at one time in three large areas in southern France—Calais, Saint-Victoret, and Arles. It was a monumental achievement accomplished on a tight schedule.

In June 1945, the 231st Medical Composite Battalion, Headquarters, Delta Base Section, was charged with the gigantic task of processing and assembling complete sets of tropically packed T/E (tables of equipment) medical equipment for issue to category II medical units redeployed through the staging areas. Storage and operational space became critical as hospital assemblies and Medical Department kits and chests were processed and held pending shipment of units. Depot strength rose to more than 500 personnel in June 1945, while it operated at peak capacity—processing requisitions for staging

[3] (1) See footnote 2, p. 380. (2) Report of Operations, Supply Division, Office of the Theater Chief Surgeon, Headquarters, Theater Service Forces, European Theater, 8 May–30 Sept. 1945.

units, filling optical prescriptions, receiving and storing unit assemblies shipped from the north of France, marrying-up assembly components shipped separately from the parent shipment, and concurrently, moving major and minor assemblies to shipside for loading. During July, the deluge of supplies and equipment from the north continued. The major activity consisted of receiving carloads of hospital assemblies while continuing to move processed assemblies from the depot when called for by the port commander. Depot storage space reached the saturation point in July forcing acquisitions of additional space including a large lot, not too distant from the depot, which had been used as a baseball diamond. Supply points were established in each of the staging areas to service deploying units and the areas more directly.

During the first 6 months of 1945, the 231st Medical Composite Battalion received 12,336 tons and distributed 6,116 tons. In addition, it processed or assembled 11 general hospitals, 10 station hospitals, 3 evacuation hospitals, 4 infirmaries, 6 general dispensaries, and 2 medical laboratories. After V–J Day, redeployment continued except that the destination became the United States.[4]

SUPPLY ACTIVITIES IN THE OCCUPATION

Depot Activities

At the end of the war in Europe, the medical depots supporting the combat armies were located deep in the heartland of Germany, some in areas soon to be occupied by the forces of other Allied Nations. This led to considerable confusion during May and June of 1945, with the transfer of medical depot sites to the French, British, and Russian forces and a concurrent relocation of United States forces into the area designated as the U.S. Occupied Zone of Germany. During this period, U.S. Army medical depot companies performed commendably, transferring not only U.S. Army stocks, but also the bulk of critical captured medical materiel into dumps in the U.S. Zone (map 27). These captured supplies were destined to be invaluable in providing medical care to vast numbers of displaced persons and prisoners of war who were under U.S. control. By 1 July 1945, transfers of area responsibilities were largely completed, and the medical supply structure to support the occupation was operational, consisting of a medical depot to support each of the separate major commands, which included Berlin, Bremen, the subdivisions of the U.S. Zone (Eastern and Western Military Districts of Germany) and U.S. forces in Austria.

The Weinheim Medical Depot was in operation as a key filler depot in the Western Military District of Germany, Seventh U.S. Army area. Operated by the 30th Medical Depot Company, the depot had originally been established on 1 May 1945 as Medical Depot M–416T with a mission to supply the 6th Army Group and Continental Advance Section. However, 1 July 1945 found

[4] (1) See footnotes 2, p. 380; and 3(2), p. 382. (2) Semiannual Report, Headquarters, 231st Medical Composite Battalion, European Theater of Operations, U.S. Army, 1 Jan.–30 June 1945.

Map 27.—Occupation zones and medical depots in postwar Germany and Austria, 1945.

the company still in the process of getting established and faced with an enormous task of expansion. After V–E Day, units redeploying for the Pacific theater and the United States were turning in their medical equipment and supplies. Again, after V–J Day, the speeding up of redeployment to the United States brought in an ever-increasing amount of excess equipment that had to be checked, repacked, and stored. Designation of the 30th Medical Depot Company as a category I occupation force unit meant that many additional problems of supply and storage would have to be met. Other medical depots, not designated as occupational units, began the process of moving a great portion of their stocks to Weinheim. Thus, the entire activity of the Weinheim Medical Depot for the final 6 months of 1945 was one of constant expansion, always with the cry for space and more space.

The original warehousing facilities at the Weinheim Medical Depot were unsatisfactory and had to be reconstructed to accommodate the storage of

FIGURE 97.—Furth Medical Depot, Nürnberg, Germany, operated by the 33d Medical Depot Company. The E-shaped building was surrounded by a large open storage area on which temporary-type buildings were added progressively to accommodate postwar needs.

6,000 tons anticipated under the occupation. All construction required at the depot was accomplished by medical troops, German civilians, and prisoners of war, with supervisory personnel and heavy construction equipment furnished by other services.

The Furth Medical Depot, in operation as the key filler depot in the Eastern Military District of Germany, Third U.S. Army area, was established by the 33d Medical Depot Company on 26 April 1945 in the waning days of combat in what was a former German Medical Sanitats Parke (Medical Point). Although the structure at this site was not particularly desirable from an issue viewpoint, it did afford adequate covered storage space for approximately 4,000 tons and an abundance of open storage space. The structure consisted of a four-story, triple-winged building with 10-foot ceilings which made forklift operations impracticable. Elevators available in the building made storage more accessible and easier to handle. Road and rail communications leading to this depot were excellent, and necessary docking and ramping facilities made shipping, unloading, and handling a minor problem. As a consequence, the depot was established as a key depot for certain items of medical supply necessary in the maintenance of U.S. forces in the occupied zone. By 31 December 1945, total stocks at the Furth Medical Depot had reached a level of approximately 7,015 tons. Ultimately, in 1946, the Furth Medical Depot was to become the only medical depot supporting the U.S. occupation forces in Germany (fig. 97).

The Bremen Medical Depot, operated by the 70th Medical Base Depot Company at a site near the port of Bremerhaven, served not only as a filler

depot for the Bremen Enclave but also as a base depot for inshipments from both the United Kingdom and the Zone of Interior. Although the depot was small, the troop strength supported directly by it was also small. Moreover, access routes into the depot were excellent. It was decided that, by augmenting the depot's ramp facilities to expedite off and on loading, the depot could continue to serve as a base depot to handle the receiving and shipping functions in support of the occupation forces.

The Berlin Medical Depot, operated by a detachment of the 15th Medical Depot Company, was established in the Berlin Enclave to initially support approximately 50,000 troops. Its site was near the grounds of the 279th Station Hospital located in a small enclosed tennis court. Due to the reduced strength of the Enclave, the depot was shortly inactivated and became an issue point under the 279th Station Hospital.

United States forces in Austria received their medical supply support from the 226th Medical Supply Detachment located in Glasenbach, Austria. This detachment, in turn, requisitioned its requirements from the Furth Medical Depot in the U.S. Occupied Zone of Germany.[5]

Medical Supply Division, Theater Chief Surgeon's Office

Although the medical depot system in the U.S. Occupied Zone of Germany and Austria was under major subordinate commanders, it was technically supervised by the Supply Division, Theater Chief Surgeon's Office, TSFET (Theater Service Forces, European Theater). From the cessation of hostilities through 31 December 1945, there was a progressive transfer of responsibilities from the TSFET (REAR) office located in Versailles, France, to the TSFET (MAIN) office in Frankfurt, Germany. As of 1 October 1945, Col. Robert L. Black, MSC, was chief of the Supply Division with station in Versailles, and Lt. Col. Louis F. Hubener, MC, Deputy Chief, Supply Division, was acting chief of the Supply Division in Frankfurt. The move of the Supply Division from TSFET (REAR) in Versailles to TSFET (MAIN) in Frankfurt was completed by 7 November 1945.

During the last 3 months of 1945, the Supply Division efforts were directed toward the buildup of (1) a minimum 60-day maintenance level in all medical depots in Germany and (2) a reserve stockpile in Germany sufficient to maintain the occupation forces until 30 June 1949. To accomplish this objective, a comprehensive study was made first of issues in Germany, and then, replacement factors were revised upward on all items on which issues in Germany were higher per 1,000 men per month than the overall theater issues. Likewise, downward revisions were made where indicated. Based upon the revised replacement factors, 60-day maintenance levels and 30 June 1949 levels

[5] (1) See footnotes 2, p. 380; and 3(2), p. 382. (2) Semiannual Report, Headquarters, 30th Medical Depot Company, European Theater of Operations, U.S. Army, 1 Jan.–30 July 1945. (3) Annual Report, Headquarters, 33d Medical Depot Company, 1 Jan.–31 Dec. 1945. (4) Annual Report, Headquarters, 70th Medical Base Depot Company, 1945. (5) Annual Report, 15th Medical Depot Company, 1 Jan.–31 Dec. 1945. (6) Annual Report, Office of the Surgeon, Headquarters, U.S. Forces in Austria, 1945. (7) Annual Report, 226th Medical Supply Detachment, U.S. Forces in Austria, 1945.

were computed by using the factors in combination with estimated troop strength for the periods involved.

To maintain a minimum 60-day supply of each item stocked in the theater, monthly maintenance requisitions were placed on the Zone of Interior. Requisitions were based on a 180-day reorder point to allow for a 120-day shipping time. Incoming shipments on such requisitions were received through the port of Bremerhaven by the Bremen Medical Depot, and from this depot, supplies were transferred as needed to other filler depots in Germany.

Each medical depot in Germany was authorized a proportionate part of the 60-day maintenance level, computed on the percentage of total troops served. Based upon information contained in the theater's consolidated stock status report, transfers among the various depots were effected to insure a minimum 60-day stock of each item, except key depot items, in each filler depot. Key depot items were books and blank forms, stocked only by the Furth Medical Depot, and teeth, stocked only by the Weinheim Medical Depot.

The buildup of the 30 June 1949 level from stocks already in the theater was stressed during the last 3 months of 1945. Approximately 10,000 long tons of medical supplies from depots in liberated countries and the United Kingdom were moved into Germany. Arrangements were made also to bring to Germany the so-called luxury items for installation in the larger, permanent medical installations in Germany. Many of these items—for example, large fixed X-ray machines—had been brought to the Continent only in small numbers during combat operations because of the special handling required. The hospitals established on a semi-Zone-of-Interior standard to support occupation forces in Germany brought about a heavy demand for these items.

During the latter part of 1945, the International Business Machines Section of the Stock Control Branch was moved from Paris to Frankfurt. As a result of the damage incurred to the equipment in transit and the difficulties encountered in installing it at the new location, the first consolidated stock status report was not prepared until the middle of December 1945. Among the problems encountered was the understandable unwillingness of French personnel to move to occupied Germany. It was, therefore, necessary to recruit German nationals with electrical accounting machine experience to staff the new section in Frankfurt.[6]

Medical Maintenance and Repair

With the reduction of medical maintenance and rebuild requirements in liberated areas, transfer was made of necessary equipment and repair parts to the Furth and Weinheim Medical Depots in the occupied zone. The large maintenance shop, located at Medical Depot M–407 in Paris, discontinued operations at the end of November and moved to Germany. At both Weinheim and

[6] (1) See footnotes 2, p. 380; and 3(2), p. 382. (2) Report of Operations, Supply Division, Office of the Theater Chief Surgeon, Headquarters, Theater Service Forces, European Theater, 1 Oct.–31 Dec. 1945. (3) War Department Technical Manual (TM) 38–420, Disposition of Excess and Surplus Property in Oversea Commands, September 1945.

Furth, the maintenance shops were staffed not only with U.S. military and civilian personnel, but also with German civilians and prisoners of war.[7]

Optical Program

The Base Optical Shop in Paris, with small portable units operated at various medical depots, continued in operation during the entire period. Bifocal corrections were accomplished by French contract and proved very satisfactory. To accomplish optical requirements in the occupied zone, small units were established at the Furth and Weinheim Medical Depots as well as a portable unit in Berlin to care for emergency cases.[8]

CIVIL AFFAIRS

In addition to the task of establishing a medical supply system to support the U.S. forces in occupied Germany, the Theater Chief Surgeon was faced with an equally difficult task of providing essential medical supplies to displaced persons camps, prisoner-of-war enclosures, and the German civilian economy. A Civil Affairs Section in the Supply Division had the mission of coordinating and supervising the execution of this mission.

Medical supplies for the U.S. Military Government mission in Germany came from two sources: (1) Civil Affairs stocks brought from the Zone of Interior and the United Kingdom, and (2) captured enemy medical materiel. In the beginning, all civil affairs stock was stored in Medical Depot M–412 at Reims. This stock included approximately 175 basic medical items, including British obstetric kits, British CAD (Civil Affairs Drug) units, and antityphus supplies. Military government authorities decided that 50 of the basic medical items should be transferred to the occupied zone and stocked in occupation depots for military government use in that area. These supplies were issued only upon approved request of military government authorities.

Over 30,000 tons of captured medical supplies and equipment were consolidated in the U.S. Occupied Zone of Germany into nine major supply dumps with locations at Heilbronn, Gauting, Ihringshausen, Neuhof, Straubing, Furth, Heidingsfeld, Treuen, and Bad Mergentheim. This number was reduced to the first six named locations to provide three dumps in each of the two military districts. A minimum of U.S. military personnel operated each dump, and former German civilian supply personnel were utilized as the main source of labor (fig. 98).

Col. Earle D. Quinnell, MC, Director, Medical Department Equipment Laboratory, Carlisle Barracks, Pa., made a special trip to France in early 1945 to inspect captured German field equipment and to arrange to have it sent back to the Zone of Interior for further study.

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[7] (1) Period Reports, Medical Depot M–407, October, November, and December 1945. (2) See footnotes 5(2) and 5(3), p. 386.

[8] See footnote 6(2), p. 387.

FIGURE 98.—Sorting and stacking captured German medical supplies and equipment.

During this period, a medical supply catalog for captured materiel with a cross-reference in English was prepared, printed, and distributed by the Theater Chief Surgeon to facilitate supply operations. This catalog was compiled from nomenclatures received from a physical inventory of the dumps, from nomenclature manuals printed by German manufacturers, and from all commercial German medical supply catalogs that could be located. The medical supply catalog for captured materiel contained approximately 9,000 items, most of which were in supply at the beginning of the occupation period. This catalog received wide distribution to using agencies to include prisoner-of-war enclosures and hospitals, displaced persons camps, military government supply officers, and German civilian users.

Numerous requests were received through technical channels requesting emergency shipments of medical supplies to military government detachments, particularly in Berlin and Austria, for German civilian use. The breakdown of normal German trade channels had created critical shortages in these remote areas with the result that the Theater Chief Surgeon's Office found itself serving as a retail agent for German civilian demands. To assure best possible

utilization of retail merchandise available in captured stocks to support the German economy, a recommendation was made for the transfer of the dumps and operating personnel, exclusive of military personnel, to the jurisdiction of U.S. military government authorities. This recommendation was ultimately approved and implemented.[9]

SUMMARY

The transition from a dynamic wartime medical supply system to a relatively static peacetime structure to support the occupation forces was accomplished rather expeditiously with minimum waste and confusion. Considering the vast quantities of medical materiel in liberated areas which had to be disposed of, either as excess for return to the Zone of Interior, surplus sale, or forwarded to Germany for retention purposes, the task was accomplished in a comparatively short time. The achievement is even more remarkable when one considers that the period witnessed not only the redeployment of numerous medical depot units, but also the wholesale return of key, experienced depot personnel to the United States. As may be expected, pilferage, stock imbalances, and shortages of sensitive items resulted from a lack of supervision in depth. Yet, the end of the year 1945 in occupied Germany saw the emergence of a reasonably efficient medical supply system, utilizing modern business machine methods and Zone of Interior station and depot supply and accounting procedures. The U.S. Army medical supply system and its personnel once again had met and effectively dealt with a challenging logistical situation.

[9] See footnotes 2, p. 380 ; 3(2), p. 382 ; and 6(2), p. 387.

Part III

MEDICAL SUPPLY IN THE WAR AGAINST JAPAN

295-453 O—68——27

CHAPTER XII

Pacific Medical Supply in the Period of Defense

MEDICAL SUPPLY IN THE MIDDLE PACIFIC

Preparation for War

As international tensions increased in the summer and the fall of 1941, every effort was made to strengthen U.S. defenses in the Pacific Area. Handicapped by lack of modern material, the War Department, nevertheless, sought not only to reinforce or establish bases on Midway, Wake, Guam, Christmas and Canton Islands, and on other islands, but also to assemble 500,000 tons of supplies and 20,000 troops for use in the Philippines.

In the Hawaiian Department, located at Fort Shafter on the island of Oahu, T.H., medical preparations for war were coordinated by the department surgeon, Col. (later Brig. Gen.) Edgar King, MC. Honolulu, T.H., was zoned with 20 aid stations strategically established and supplied, while the Preparedness Committee of the Honolulu County Medical Society set up teams of disaster surgeons who would be ready for call by the U.S. Armed Forces. At the same time, arrangements were made for ambulance service. A plasma bank, which was financed with a $4,000 grant from the Honolulu Chamber of Commerce, was organized by Dr. Forrest J. Pinkerton. Several collecting stations were established, and the laboratory work was accomplished at the Queen's Hospital. Meanwhile, a group of women were making surgical dressings for the Hawaii Chapter of the American Red Cross, under the immediate direction of Mrs. A. V. Molyneaux, chairman of the production unit, and supervised by Mr. John F. Gray, a field director of the American Red Cross. On 25 November and 4 December 1941, a total of 58,000 Army-type surgical dressings were sent to the station hospital at Schofield Barracks, T.H., at the request of Colonel King.

Medical supplies stored at the Hawaiian Medical Supply Depot at Fort Shafter were considered suitable for the requirements of the Hawaiian Department. A considerable amount of the reserve equipment had been made ready for any emergency.[1]

Organization of the Medical Supply System for War

At the outbreak of hostilities, war reserves of the Hawaiian Medical Supply Depot were immediately picked up in depot stocks and utilized to build

[1] (1) Biennial Report of the Chief of Staff of the United States Army, 1 July 1941 to 30 June 1943, to the Secretary of War. Washington: U.S. Government Printing Office, 1943, pp. 3–5. (2) Annual Report, Surgeon, Hawaiian Department, 1941. (3) Memorandum, Brig. Gen. Edgar King, for Editor, History of the Medical Department, 22 Mar. 1950.

FIGURE 99.—Tripler General Hospital.

provisional hospitals and expand existing facilities. These stocks, in general, were grossly deficient in many respects. Hospital assemblages stored as units were found to be only partially complete, and, in some instances, the equipment was of World War I vintage and of little real value. Available current depot stocks were utilized to offset these deficiencies wherever possible. Where items were not immediately available in depot stocks and time precluded requisitioning on the Zone of Interior, procurement of local commercial stocks was effected to the greatest extent possible. This source was limited, however, as most commercial stocks were also procured from the Zone of Interior. The Surgeon General's Office, meanwhile, made an estimate of the requirements that would be generated by the attack on Pearl Harbor.

In the meantime, shortly after the attack, 18,000 surgical dressings were furnished to the Tripler General Hospital, Honolulu (fig. 99), and the U.S. Naval Hospital at Pearl Harbor in response to emergency calls to the Red Cross. Also, on the same morning of 7 December 1941 and during the next 2 days, 750 units of 250 cc. of plasma were provided to both Army and Navy hospitals. The major collection stations were bleeding donors at the rate of 50 per hour. During the first 15 days, 3,400 donors were bled.

Located at Fort Shafter, the Hawaiian Medical Supply Depot had a complement of 6 officers and 32 enlisted men and was responsible for supplying the Tripler General Hospital, the station hospital at Schofield Barracks, the provisional hospitals established subsequent to Pearl Harbor, and the dispensaries serving service and tactical units. All requisitions prepared by the depot were routed through the Surgeon's Office, Headquarters, Hawaiian Department.

Arrival of the 5th Medical Supply Depot

On 16 April 1942, the 5th Medical Supply Depot, organized under TOE (table of organization and equipment) 8–661 and under the command of Lt. Col. James P. Gill, MC, arrived in the Hawaiian Department from the Zone of Interior with 11 officers and 90 enlisted men. The Hawaiian Medical Supply Depot was inactivated 2½ months later, and all personnel and equipment were transferred to the 5th Medical Supply Depot.

To supply the service commands on the islands of Maui, Kauai, and Hawaii, branch depots were established. The branch depot at Schofield Barracks, designated Post Dispensary No. 2, was further enlarged by the construction of five additional warehouses serving 40,000 troops at its peak of operations. Another warehouse was added at Fort Ruger, T.H., making 11 warehouses in all on the island of Oahu.

Many critical items of supply were dispersed for storage in the various hospitals on Oahu and outlying islands. This move was considered essential to minimize the destruction of supplies by enemy bombing. A new warehouse was constructed on the north shore of Oahu outside Schofield Barracks, and plans were made to construct a receiving warehouse at Fort Shafter to receive critical items and stores before dispersal. A subdepot at Hickam Field, Honolulu, was established in July to service Army Air Forces personnel only. This process reached its peak late in 1942 when the 5th Medical Supply Depot was spread over 36 storage locations aggregating 185,000 square feet.

War reserve stock carried by the Hawaiian Medical Supply Depot before 7 December 1941 was issued after the Pearl Harbor attack. Stocks in 1942 thus consisted of 31 units of final reserve for the island of Oahu, 6 units for the island of Hawaii, and 4 units each for the islands of Maui and Kauai.

At times, the supply of certain items was exhausted, but usually, a substitute item was available or local purchase was made until radioed requisitions could be furnished from the mainland. Requisitions were generally filled within 7 days after receipt.

Plans for Overseas Action

The first established plan for supply of overseas combat operations was transmitted on 22 January 1942. Concurrently, the San Francisco Port of Embarkation was designated as the port to which all supply matters for the

command would be referred. At that time, the maximum supply level was set at 70 days, based on requirements for the Army, plus the Navy and the Marines, civilians, prisoners of war, and Allied Nations personnel, where applicable. In July 1942, the level was raised by the War Department to 90 days. By this time, the medical maintenance unit and siege unit were being used to automatically supply the Hawaiian Department while requisitions were submitted to the San Francisco Port of Embarkation as a supplemental means of supply for noncontrolled items.

Receipts of Supplies

During 1942 and 1943, before the War Department shipping document was in use or the later strict regulations governing the rapid forwarding of shipping documents from ports of embarkation to overseas bases had been issued, it was a rare occurrence for the Medical Department to be advised of the arrival of its supplies until they were actually discharged and lying on the piers at Honolulu. As a consequence, it was impossible to furnish the means of transportation to the dispersed warehouse facilities of the medical supply depot. To overcome this possible source of confusion, it was necessary to assign an officer of the depot and a staff of four to eight enlisted men to work at the piers in close liaison with the port authorities. Informed as to the supplies on order and proposed storage locations, the detachment provided an invaluable service in clearing the docks of medical supplies. This pier liaison section also was responsible for handling similar responsibilities in shipments made by the 5th Medical Supply Depot to forward areas and to outlying islands.

Requisitioning by Units

All using agencies and supply points obtained replenishment of medical supplies by monthly requisitions on the 5th Medical Supply Depot through the office of the base service command surgeon, where they were edited for authorization and availability. Tactical organizations obtained supplies in a like manner, except that requisitions from subordinate units of higher echelons required the approval of their surgeon. Moreover, supply sections were maintained by the various divisions, and issues to subordinate units were made from the divisional supply points.

Organization Equipment

When tactical units were being staged in the command, a major problem was encountered in receiving and identifying organizational equipment shipped from the Zone of Interior. Many tactical units arrived with incomplete medical equipment which had to be supplemented before their departure for combat missions. Scarcity of stocks at that time inflated the problem. As a result, all organizational equipment (hospital assemblies excepted) was picked up in depot stocks, and the units upon arrival were directed to submit requisitions to the depot to cover any shortages in unit equipment. Hospital assem-

blies that arrived before the unit was deployed were stored intact in the depot pending issue. If a unit assembly did not arrive before the unit's departure, components were issued from depot stocks, and all shortages were backordered. In such instances, the unit assembly upon arrival was dismantled, and the components were picked up in depot stock.[2]

Support of Defense Units of the Hawaiian Department

Tripler General Hospital, the center for treatment of many battle casualties of Pearl Harbor, reported a fair supply of sulfanilamide powder on hand and a sufficient quantity of plasma donated by civilian physicians. The problem of safe storage of such critical items was resolved by constructing a large, stormproof warehouse and by using concrete storerooms in the Farrington and Kamehameha areas of the hospital.

At the 1st Station Hospital, medical supplies were stacked initially in tents and on platforms in the dock area; then, they were removed to a coconut grove, 2½ miles from the hospital, and unpacked and classified. A portable electrocardiograph machine, received on 15 October 1942, aided a great deal in diagnostic procedure. The lack of other equipment, however, was a persistent handicap.

The 148th General Hospital, because it had not been provided with a consolidated shipping list of equipment, was unable to account for all items of the 1,000-bed hospital unit delivered to the port of embarkation in mid-January 1942. It was only by constant checking with the office of the Port Quartermaster that many short items were discovered and supplied before the unit's shipment to the Hawaiian Department in April. Upon establishment of the unit near Mountain View, Hawaii, two small warehouses, each 50 by 20 feet, were used—one, as a utility storeroom and workshop, and the other, as an issue storeroom. Supplies in closed stock were kept in a larger warehouse located at Olaa, T.H., 6 miles away.

The 26th Station Hospital experienced similar unloading and storage problems upon its arrival from the mainland. The supplies, consisting of 1,763 crates, were manhandled mostly by hospital personnel and were stored in and filled seven hospital tents in the dock area. Because of misleading labels on the shipping boxes and limited storage space, unpacking was not systematic. The department surgeon caused the medical supply dump serving both the 26th and the 1st Station Hospitals to be moved to a coconut grove 2½ miles away. There, supplies were stored in tents and partially unpacked and classified. By April, tent warehouses were established in the hospital area where permanent warehouses were being constructed. Repeated moves had caused unnecessary labor and personnel trouble; however, little loss or waste was experienced.

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[2] (1) See footnote 1(2), p. 393. (2) Ronka, Enzio K. F.: History of Professional Experiences, World War II, in Central Pacific Base Command or Hawaiian Department. [Official record.] (3) Whitehill, Buell: Administrative History of Medical Activities in the Middle Pacific. [Official record.] (4) Annual Report, 5th Medical Supply Depot, 1942.

FIGURE 100.—A. 2d Lt. Allan W. Phelps, MAC, medical supply officer, Task Force 4591, and native workers. B. Interior view of the medical supply warehouse on Christmas Island.

Because supplies were received directly from both Fort Mason, San Francisco, and the Hawaiian Department, there was some duplication of equipment, but this situation was soon corrected.

The 24th Infantry Division had its full table of basic allowance of medical organizational equipment with very few items not available. Nonstandard medical equipment included a treatment and instrument chest, oxygen equipment, linen chest (towels, pajamas, and bathrobes), and a protective clothing chest. Emergency medical equipment was stored at the Kahuku Hospital, the Waialua Hospital, and at the two medical dumps. Supplies were stored in 9- by 12-foot houses at Pupukea Heights and Eucalyptus Forest. Essential nonstandard items, such as Pentothal sodium (thiopental sodium) for intravenous anesthesia, dry plasma, and normal saline solution, were issued to larger medical units of the division. Mountain rescue equipment, consisting of a basket litter

modified by a board bottom and supplemented by ropes, was maintained by the 24th Medical Battalion.[3]

Task Force 4591

Almost immediately after the Japanese struck, U.S. forces began to spread to scattered islands in that area of the Pacific.

Before World War II, most flights over the vast areas of the Pacific had been in sea-based planes. On 29 January 1942, slightly less than 2 months after Pearl Harbor, Task Force (movement) 4591 slipped out of the San Francisco Harbor en route to Christmas and Canton Islands and Bora Bora in the Society Islands—its mission being to help strengthen the bridge of airbases across the Pacific.

A section of this task force arrived at Christmas Island 10 days later and, after a rather laborious delivery of the cargo, set up a 100-bed station hospital which proved functional despite the obsolescence of the medical chests which had been packed during World War I.

The medical supply officer for this pioneering task force was 2d Lt. (later Capt.) Allan W. Phelps, MAC, who had been in the Army only 6 weeks when he departed from San Francisco. His medical resupply point was the Hawaiian Medical Supply Depot at Fort Shafter, and soon the deleterious effects of outside storage on precious medical stocks was realized. An excellent Polynesian thatched medical supply warehouse was contracted for and built, using as a medium of exchange unneeded red flannel bandage (fig. 100).

MEDICAL SUPPLY IN THE DEFENSE OF THE PHILIPPINES

Prewar Preparations

Before General of the Army Douglas MacArthur was appointed Commander, USAFFE (U.S. Army Forces in the Far East), the war plans for the Philippine Department were being vigorously revised to meet war needs. The induction of Philippine Army troops into USAFFE and the possibility of a prolonged period of resistance to invading forces made it necessary to modify the war plans by developing a large reserve of hospital beds in Manila, P.I. Toward this end, a general hospital was issued to the Manila Hospital Center, part of another was stored and used at Limay on Bataan, and two others were left in the Manila depot. At the same time, officers and enlisted men of the Philippine Army were trained in a special school for medical supply officers at the Philippine Medical Supply Depot. Timely requests for medical equipment for hospitals and field operations resulted in the arrival of two general hospitals 2 weeks before the war began as well as five

[3] (1) Letter, Col. A. C. Miller, MC, Commanding Officer, Tripler General Hospital, to Surgeon, Hawaiian Department, 15 Apr. 1942, subject: Supplemental Annual Report (attached to Annual Report, Tripler General Hospital, 1941). (2) Annual Report, 1st Station Hospital, Hawaiian Department, 1942. (3) Annual Report, 148th General Hospital, 1942. (4) Annual Report, 26th Station Hospital, 1942. (5) Annual Report, Surgeon, 24th Infantry Division, 1942.

(250-bed) station hospitals. Also, 90 regimental dispensaries either were in preparation for shipment overseas or were already en route to the Philippines by that date.[4]

Medical supply plans called for the enlargement of the medical supply depot in Manila which was to be relocated on the outskirts of the city to be less vulnerable to air attack. Construction of subdepots at Tarlac, Los Banõs, and Cebu had not gone past the planning stage when the Japanese attacked.

Medical Supply Activities on Luzon

The reality of war reached the Philippines on 8 December 1941, with the bombing of Clark Field. The subsequent bombing of Nichols Field and the strafing of the McKinley area made it advisable to move medical personnel and patients to the vicinity of Manila.

All available hospital supplies in Manila were hastily purchased and distributed to all points of Luzon. With the order to evacuate Manila on 23 December 1941, the Philippine Medical Supply Depot was located near General Hospital No. 1 on the Bataan-Mariveles Road, and by 29 December, a subdepot was established at Orion on Bataan, to furnish frontline troops with supplies. This depot was abandoned on 4 January 1942, when it was bombed.

From 23 December 1941 to 1 January 1942, personnel of the Philippine Medical Supply Depot worked with very little rest. Every vehicle that left Manila for Bataan reached its destination. The depot supplied General Hospital No. 2 with necessary supplies which were supplemented by small shipments from Cebu and Iloilo. The demand for quinine, sulfonamides, and vitamins was greater than the supply.

Medical service in the field was greatly handicapped because of having to rely on improvised 1917-type medical chests. Although new field equipment had been ordered and was on the way, none had yet been made available despite the efforts of the department surgeon. There was practically no reserve of medical supplies for the Philippine Army units, and there was a serious lack of laboratory equipment, such as microscopes, needed to help in the fight against intestinal infections and malaria.

During the Bataan campaign, many Philippine Army units, which had reached Bataan without adequate organizational or individual equipment or without training in the conservation of supplies, suffered unduly from various diseases. During the enemy breakthrough of 20 and 24 January 1942, medical companies lost a large portion of their equipment. As the Japanese cut supply routes by infiltration, serious shortages of litters and blankets occurred. Surgical equipment became nonexistent. Because of the severe shortage of antimalarial drugs, a maximum of 8 gm. of quinine was allowed for each case

[4] This section is based on Cooper, Wibb E.: Medical Department Activities in the Philippines from 1941 to 6 May 1942, and Including Medical Activities in Japanese Prisoner of War Camps. [Official record.]

of malaria. Every effort was made to prevent hoarding by unit supply officers. The problem was somewhat eased by airshipment from Cebu of small amounts of quinine and Atabrine. Unit supply officers were urged to salvage dressings and bandages and to practice extreme economy in the use of all types of medical supplies.

On 30 January 1942, a subdepot was established on Corregidor to hold all supplies and equipment for Bataan above a 6-week level. Supplies were stored in trenches to safeguard them from shell and bomb fragments and from strafing. Flammable materials were buried in pits.

On 8 April 1942, all critical supplies on hand at the main Bataan depot were removed to General Hospital No. 2, located east of General Hospital No. 1 on the Mariveles-Cabcaben Road. By evening, an attempt was made to ship supplies from the Cabcaben dock, but it failed. Supplies finally reached Corregidor on 9 April.

After the capitulation of Bataan, three shipments of quinine, sulfonamides, and vitamins sent from the south were received by plane and submarine. The majority of supplies of the Philippine Medical Supply Depot on Corregidor were stored in the Malinta Tunnel. On 22 April, the depot was destroyed by shellfire. Surrender to the Japanese followed on 6 May 1942.

Medical Supply of the Visayan-Mindanao Force

Having established headquarters at Cebu on 27 August 1941, six American officers established a training program for troops of the Philippine Army in the Visayan Islands and Mindanao. The medical service was handled by the medical detachments of the divisions. Before the war, plans were made not only to establish a medical base at Cebu with one general hospital, utilizing the facilities and personnel of the Southern Islands Hospital as a nucleus, but also to establish another general hospital at Talisay. The promised equipment of one general hospital was lost in the sinking of the U.S.S. *Corregidor* in Manila Bay.

After combing the islands for medical supplies, it was discovered that there were some drugs available from three wholesale drug houses in Cebu. Fortunately, a large amount of food and medical supplies was confiscated from the SS *John Lykes* docked at Cebu. A large quantity of quinine tablets was located in the Koronadal Valley Project and in the hospital of the North Negros Sugar Co., which had just received its semiannual requisition.

One or two large consignments of quinine were flown in from Australia, but were forwarded to Bataan where, at the time, the need was greater.

Before surrender came, it became necessary to ration quinine and to use it only for treatment rather than as a preventive measure. Medical officers were ordered to discontinue its use as soon as the patient was able to return to duty.

MEDICAL SUPPLY ACTIVITIES IN AUSTRALIA—1941–42

Early Organization

On 12 December 1941, a convoy led by the cruiser U.S.S. *Pensacola* was diverted from its Philippine Islands destination to Brisbane, Australia. Task Force, South Pacific, upon arrival in Brisbane became USFIA (U.S. Forces in Australia) with Maj. Jesse T. Harper, MC, appointed surgeon. However, 2 weeks later, USFIA became USAFIA (U.S. Army Forces in Australia) with Maj. (later Lt. Col.) George S. Littell, MC, as surgeon.

Changing Mission Concepts

Until the U.S.S. *Pensacola* convoy was diverted to Australia, the primary mission assigned to its commander was to get the convoy to the Philippines. It was not contemplated nor planned to station large numbers of U.S. troops in Australia. When USAFIA was established under the command of Maj. Gen. (later Lt. Gen.) George H. Brett, its mission still was to organize a service of supply to support the Philippines. The plan contemplated establishing bases in Australia for long-range aircraft operations, however, and General Brett was instructed to make his command predominantly air.

Thus, the early efforts of USAFIA were directed toward the shipment of critically needed supplies—food, drugs, and ammunition—to the Philippines and toward the preparation of bases for the reception of planes from the United States for transshipment to the Philippines. In addition, the general and special staff sections of Headquarters, USAFIA, were operating the supply and administrative services for all U.S. Army troops in Australia. By March 1942, the strategic pattern in the Pacific Area had changed radically, and the mission of USAFIA changed in consequence. There were three objectives under the new mission concept: (1) to provide administrative and supply service for the U.S. Army troops already in Australia; (2) to deploy these troops strategically to meet the threat of enemy invasion; and (3) to plan for long-range buildup of U.S. Army bases in Australia and for the reception of combat troops, of which two divisions were en route. These threefold objectives continued to be the concern of USAFIA, and later that of USASOS (U.S. Army Services of Supply), until early 1943.

Early Medical Department Activities

The activities of medical supply are always inextricably bound to those of the other activities of the medical service. Before the middle of April 1942, there was not much in the way of a formal medical supply organization in Australia. Despite this handicap and the burden of virtually single-handed operation, the Surgeon (first, Major Littell, and then, Col. (later Brig. Gen.) Percy J. Carroll), USAFIA, accomplished much.

Before the fall of the Philippines on 6 May 1942, two main tasks were facing the surgeon: (1) The medical care, including hospitalization, for the rapidly increasing number of U.S. Army troops in Australia; and (2) the procurement of, and shipment of, sorely needed medical supplies to the Philippines. To these was added, later, the planning for a medical service for the greatly expanded Australian supply base.

There was only one obvious solution to the task of medical care for U.S. Army troops. On 15 January 1942, as a result of a high-level meeting with Australian authorities, an agreement was reached for complete medical support, including hospitalization, by the Australians. It was contemplated that this support would be needed for 3 to 4 months for 25,000 U.S. Army troops. Based on this agreement, U.S. Army medical units as they began to arrive and function would be authorized to requisition medical supplies directly from Australian sources.

Although the immediate problem of hospitalization for U.S. Army troops had been temporarily solved by using Australian facilities, the surgeon and his small staff continued to expend their energies trying to find sites for the U.S. Army medical units already in the theater and for those on the way. Existing facilities in Australia to house hospitals of 100 or 200 beds were just not available, much less for 500 to 1,000 beds. Later, this had a marked impact on medical supply activities because all current designs for hospital assemblages had to be modified.

Medical Organization

Meanwhile, the medical service had undergone parallel organizational and personnel changes in rapid succession. From the arrival of the U.S.S. *Pensacola* convoy in Australia in December 1941 until 2 February 1942, Major Littell, as surgeon, and a few medical officers had operated the entire medical service of the theater, including the medical supply efforts for relief of the Philippines. On 2 February, Major Littell was replaced as Surgeon, USAFIA, by Lt. Col. (later Brig. Gen.) George W. Rice, MC, who had been sent to Australia for this specific assignment by The Surgeon General. On 7 February, just 5 days after his assignment, Colonel Rice was in turn replaced by Colonel Carroll. The latter had just arrived in Australia after a medical odyssey during which he had accompanied more than 200 seriously wounded patients from the Philippines on the USAHS *Mactan*, a creaky Philippine interisland freighter designated as a hospital ship. Being the ranking medical officer of the theater, he was appointed surgeon. The medical merry-go-round came to a standstill, at least temporarily.

After Major Littell, who also served as the surgeon's executive officer, was appointed medical supply officer, he was also designated commanding officer of the first medical supply depot established in Australia on 14 February 1942. The site of the 9th Medical Supply Depot was a former taxicab garage in Melbourne (fig. 101).

FIGURE 101.—Site of the 9th Medical Supply Depot Base Section 4, Melbourne, Australia, was a former taxicab garage.

Major Littell and his cohorts had carried on much medical supply activity before his appointment as medical supply officer. They had succeeded in rounding up a sizable mass of medical supplies even before the depot was established. Now, they were finally able to assemble these under one roof and to properly sort, pack, and inventory them. These supplies came from the U.S.S. *Pensacola* convoy, from local procurement, from borrowing from the Australians, and from other, sometimes unorthodox, means. For example, an order of the theater commander enabled the medical supply officer to requisition 600 sorely needed mattresses from the U.S.S. *West Point* which docked in Melbourne on 6 June 1942. Local requirements were also surveyed, and requisitions were submitted to the United States blindly because neither medical supply catalog nor trained supply personnel were available.

Relief for the Philippines

During January, February, and early March 1942, the surgeon and his staff put in many frustrating hours trying to obtain medical supplies for shipment over the long, tenuous supply lines to the Philippines (map 28). Requisitions for General MacArthur's hard-pressed forces arrived with pitiful regularity. Quantities needed were such as to swamp the capabilities of a country like Australia with a population of less than 8 million. In addition, the difficulties of running the blockade either by air or by water were formidable. Nevertheless, some 10 airshipments and 2 water shipments of quinine,

MAP 28.—Supply routes to the Philippine Islands, 1941–42.

morphine, anesthetics, antihelminthics, vitamins, and other vital drugs did get through. Colonel Carroll, a nonsmoker, was infuriated by reports that pilots in trouble were dumping medical supplies rather than cigarettes.

The efforts by the surgeon and his staff to round up the quantities of medical supplies that they did were only short of miracles. Colonel Littell and Maj. (later Col.) John D. Blair, MC, scoured the cities of Melbourne and Sydney, raided incoming vessels, gathered up distressed cargo, borrowed from the Australians, and purchased locally every bit of medical supplies they could find. Then, they personally packed it in boxes, loaded it on trucks, and drove it to the airfields where they helped transfer it to planes.

In spite of all these efforts, the bottom of the barrel was soon reached. On 27 February 1942, Colonel Carroll emphasized the severity of the situation in his diary: "The medical supply officer is having great trouble getting together sufficient supplies to fill the radio requisitions from PLUM [code for Philippines]. The Australians are short and we will have to replace their

depleted stocks as soon as we can get things on the way." With the fall of Bataan on 9 April 1942, virtually all organized efforts to aid the Philippines came to a tragic end.[5]

Reorganization of Headquarters

With the arrival of General MacArthur in Australia on 17 March 1942, the entire organizational framework was redesigned by the creation of a general headquarters with General MacArthur as Supreme Commander, Southwest Pacific Area. Headquarters, USAFIA, now became the overall administrative and supply headquarters for all U.S. Army Forces in Australia, being in effect a theater headquarters for U.S. troops.[6]

Arrival of Medical Supply Depot Personnel

On 6 April 1942, the first organized medical supply depot personnel arrived in Australia. This consisted of one section of the 4th Medical Supply Depot (later redesignated the 9th), comprising 3 officers and 42 enlisted men. The need for trained supply personnel was so acute that this group, pitifully small though it was, had to be shared. Accordingly, it was split into two groups. One group, comprising 1 officer and 13 enlisted men, was sent to staff the depot at Melbourne, and the other, with the remaining personnel, was assigned to Brisbane where an additional depot was being opened. Because of the continued shortage of supply personnel, this latter group was later again split, and an officer and small detachment were sent to open a depot in Townsville (map 29).

This section of 45 men, constituting the entire medical supply depot organization for the theater for 6 months, operated three depots efficiently during the buildup and did a superior job under very adverse circumstances. The three officers deserve mention as they continued to serve in supply capacities throughout the duration of the war. Maj. (later Lt. Col.) Arnold J. Woodman, DC, operated the Melbourne depot; Capt. (later Maj.) Leonard H. Kolb, MC, the Brisbane depot; and Maj. Edward T. Wolf, the Townsville depot.[7]

Organization for Medical Supply

On 12 April 1942, a group of 18 officers of the Medical Department including 2 nurses arrived in Australia after a rugged 30-day trip from San

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[5] This section on the early developments of medical supply activities in Australia is based on (1) Annual Report, Chief Surgeon, U.S. Army Services of Supply, Southwest Pacific Area, 1942. (2) Diary, Col. Percy J. Carroll, MC, December 1941–30 June 1942. (3) Daily Diary, Medical Service, U.S. Forces in Australia, 10 Dec. 1941–31 July 1942.

[6] Matloff, Maurice, and Snell, Edwin M.: Strategic Planning for Coalition Warfare, 1941–42, United States Army in World War II. The War Department. Washington: U.S. Government Printing Office, 1953, pp. 169–171.

[7] (1) See footnote 5, above. (2) Quarterly Reports, 9th Medical Supply Depot, Base Section 7, Southwest Pacific Area, 1 June 1942 through September 1943.

MAP 29.—Medical supply depots and base sections in Australia, April 1942.

Francisco on an unescorted Dutch freighter. Among this group was Maj. (later Col.) Alfonso M. Libasci, MC, who was trained in depot operations but had had no staff experience. Only one other officer of the group, Col. Oscar P. Snyder, DC, was Regular Army. The others were newly activated Reserve officers. Major Libasci (fig. 102) was assigned as chief of the Supply and Fiscal Section, relieving Colonel Littell.

Medical supply objectives.—The newly created Supply and Fiscal Section of the surgeon's office consisted of a chief and two Medical Administrative Corps officers—one of whom served as fiscal officer and the other as procurement officer; a second lieutenant who served as executive assistant to the chief; and a few clerks. The new chief of medical supply faced a formidable task. Although much had been done by his predecessor and done well, there was still much to be done, little time to do it, and little to work with. Major Libasci brought into the theater in his personal baggage the only available copy of a medical supply catalog. It was months before additional copies were received.[8]

Theater medical supply plan.—On 11 May 1942, just 1 month after arriving in the theater, Major Libasci submitted his medical supply plan for the theater to the Assistant Chief of Staff, G–4. The plan was approved with-

[8] (1) See footnote 5, p. 406. (2) Personal observations of Col. Alphonso M. Libasci, MC, USA (Ret.).

FIGURE 102.—Col. Alfonso M. Libasci, MC, Chief, Supply and Fiscal Section, U.S. Army Forces in Australia, 1942.

out delay and soon became the pattern for other supply services. It covered all phases of supply operations, including depot locations and distribution areas, storage and issue procedures, classification of medical supplies, requisitioning procedures, procurement policies, and control of depot stocks.

The depot plan provided for base, intermediate, and advanced depots. Base depots, planned for the port cities of Sydney, Brisbane, Townsville, and Adelaide, would ship to intermediate and advanced depots located in remote areas. All medical supply depots were designated as branch depots under the technical control of the surgeon. This authority, given by G–4 with extreme reluctance after a tough battle, was an essential requirement.

The supply plan delineated requisitioning procedures and clarified once and for all the existing confusion in connection with the classification of medical supplies. There seemed to be universal confusion between the medical supply catalog classification into classes 1–9 and the G–4 classification into classes I–IV. As a result, supply personnel had erroneously submitted requisitions for medical class 4 supplies instead of G–4 class IV. This resulted in great shortages later.

Class I supplies were shipped to Australia from the United States without requisition in the form of medical maintenance units, each unit comprising

a 30-day supply for 10,000 troops. The plan provided for reception of these medical maintenance units at the port depots, which, in turn, would automatically feed the intermediate and advanced depots. Medical units, in turn, could requisition only the items on the medical maintenance unit list initially until stocks of other items arrived in the theater. The catalog contained a mimeographed list of medical maintenance unit items.

Class II supplies were obtained by requisition from the United States, in quantities based on consolidated monthly reports of shortages in unit assemblages reported by medical organizations as they arrived and were set up in the theater. These supplies were issued to the medical units reporting such shortages in unit assemblages without requisition.

Class III supplies were fuels and lubricants.

Class IV supplies were those items that did not fall into any of the other categories and later constituted the bulk of all medical items. These were to be obtained from the United States on a requisitioning basis and were issued to units on a monthly requisitioning basis.

Other provisions of the plan outlined supply and storage procedures in depots and base sections, inventory control methods, monthly inventory reports for the medical supply officer, and so on. This basic plan integrated the entire medical supply effort and laid the foundation for future policies and expansion.[9]

Medical supply progress.—Great strides were made in medical supply during the first few months. All assets were inventoried and consolidated, and central stock records were established for the theater as well as for each depot. Requirements of all classes were computed, and requisitions based on projected troop strength were prepared and forwarded to the United States. Procurement in Australia was thoroughly surveyed and coordinated through the appropriate Australian departments. Supply depot personnel needs were determined and requisitions prepared and submitted.

By June 1942, there was a medical supply depot in each active base section and each had at least a 30-day level of class I supplies (medical maintenance unit items). Table of basic allowance items of class II supplies also had begun to arrive, so that by the end of the month, unit assemblages were 92 percent complete. Stray shipments, coded boxes, distressed cargo, and so forth were sorted, repacked, inventoried, and placed in stock for issue. Supplies began to arrive from the United States in quantity, and medical supply became a going concern. But, at this stage, austerity prevailed because all that was available for issue were items received to provide for table of basic allowance shortages or medical maintenance unit items.

During late June 1942, the Australians proposed a merger of medical supply stocks into jointly operated and stocked medical depots, but an alter-

[9](1) Letter, Maj. A. M. Libasci, MC, to Assistant Chief of Staff, G–4, 11 May 1942, subject: Medical Supply Plan for Australia. (2) Letters, Colonel Libasci, to Colonel Tyng, dated 5 and 31 May and 2 July 1942, respectively. [This summary was presumably made at a later date since Major Libasci is consistently referred to as Colonel—a rank he did not attain until early in 1944.]

FIGURE 103.—The wreck of the freighter SS *Rufus King* on a barrier reef near Brisbane, Australia, July 1942.

native proposal to permit reciprocal emergency requisitioning upon each other's depots was accepted. This system worked well throughout the war.

On 20 July 1942, Headquarters, USASOS, was created and USAFIA was inactivated. This was actually nothing more than a change in name; all existing functions and directives remained the same.

Also, on 8 July 1942, the medical supply service was dealt a bitter and almost disastrous blow. The freighter SS *Rufus King* carrying the assemblages for nine station and three general hospitals—totaling 4,000 beds (17,200 boxes)—broke up on the barrier reef just outside of Brisbane Harbor. Early reports indicated that the ship had broken in half and that, although each half was afloat, the high seas made salvage operations impossible (fig. 103).

Fortunately, the seas subsided, and an Australian salvage crew of more than 200 men aided by U.S. Army Medical Department personnel went to work. Thanks to the skillful and daring efforts of these men more than 85 percent of the supplies aboard were salvaged. Much credit for this feat is also due to the personnel of the Brisbane medical supply depot who worked long hours rehabilitating the wet and damaged equipment. Had this salvage operation failed, it would probably have taken months to get replacements. Meanwhile, medical care would have been hampered as medical personnel waited idly in Australia for their assemblages.

During this early period, there was an incessant demand from U.S. troops for vitamins to supplement the inadequate ration, especially in remote areas. Eventually, it became impossible to satisfy requests. It was pointed out to the command that vitamins were not a substitute for food and that efforts must

be made to improve the ration. After much pressure, this understanding was finally accepted.[10]

BUILDUP IN AUSTRALIA

After 5 months of uninterrupted victories, the enemy suffered a severe blow on 8 May 1942 in the Battle of the Coral Sea. As a result, enemy strategy was changed from heavy, overwhelming strikes to piecemeal efforts to gain footholds in New Guinea, the Solomons, and New Hebrides and thus to isolate Australia.

The U.S. strategy during the first year was purely defensive and consisted of trying to stop the advances wherever the Japanese attacked. During this first year, the major effort was directed at buildup of the base in Australia.

Base Section Organization

Because of the rural nature of the Australian mainland, it was decided early that decentralization of supplies would be necessary. Accordingly, the continent was divided into base sections roughly corresponding to the six States of Australia, except for the State of Queensland where two base sections were established because of its size and importance. At the height of the buildup, there were seven Australian base sections in all, with headquarters in Melbourne, Sydney, Perth, Adelaide, Darwin, Brisbane, and Townsville (map 29).

The missions of the base sections were as follows: (1) To operate a service command for the administration of the several base sections, ports, and camps; (2) to receive and assemble all U.S. Army troops, supplies, and equipment arriving in Australia; and (3) to perform such services of supply and administrative functions for combat troops as would enable them to move freely and with a minimum of delay.

Base section commanders were charged with the responsibility for providing administration, quarters, supplies, hospitalization, and evacuation for all U.S. Army troops arriving in, or assigned to, their respective areas. To accomplish this, they were provided with complete staffs, including, of course, base section surgeons.

Early in this organization, a controversy occurred in regard to the degree of control which the base section commanders exercised over the operations of the technical sections of their staffs. It was finally agreed that base section commanders would not interfere with technical operational instuctions issued by the chiefs of services to their respective staff officers in the base sections.

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[10] (1) Letter, Col. Lester S. Ostrander, AGD, Adjutant General, Office of the Commanding General, Headquarters, U.S. Army Forces in Australia, to Commanding Officer, Base Section No. 1, 30 May 1942, subject: Inventories of Medical Equipment in Base Sections. (2) Letter, Maj. A. M. Libasci, MC, to Base Section Surgeon, Base Section 4, 22 June 1942, subject: Instructions Reference Requisitioning of Medical Supplies. (3) Check Sheet, Chief of Medical Supply Section, Office of the Chief Surgeon, Headquarters, U.S. Army Forces in Australia, to G–4, Warehousing and Distribution Section, 19 June 1942, subject: Medical Supply Depots Operating in Australia. (4) See footnote 5, p. 406.

This assured the surgeon complete control of theater stocks wherever they were stored.

As the military situation crystallized, the base sections assumed roles of varying importance. It became obvious that the most ideal sites for staging of troops, for hospitals, and for depots were near the large port cities of Melbourne, Sydney, Brisbane, and Townsville on the east coast. Accordingly, base sections in south and west Australia never reached large size nor importance and were inactivated early. Similarly, Base Section 1 with headquarters in the Darwin area, although strategically important, was never built up because of its extreme inaccessibility over large expanses of waste desert with poor roads.

The surgeon of each base section organized his staff along functional lines. As the base sections grew in size so did the functions assigned and staff required. The larger bases in Melbourne, Sydney, and Brisbane had individual officers in charge of personnel, supply, hospitalization, evacuation, nursing, dental, and veterinary activities, in addition to the surgeon and a deputy or executive officer. Professional consultants were not available at this stage of organization.[11]

Medical Supply Organization

The original medical supply plan provided for a base medical supply depot at each of the six main port cities of Melbourne, Sydney, Brisbane, Townsville, Perth, and Adelaide. These depots were to ship to intermediate depots farther inland, which in turn were to supply advance depots or dumps. This decentralization was deemed necessary because of the totally inadequate rail and road net. It had the further advantage of dispersing stocks so that loss to the enemy of one or all of these ports would still leave reserves available elsewhere. Because of later developments, depots were not established in each base section. During the buildup in Australia, the important medical supply depots were located in Melbourne, Sydney, Brisbane, and Townsville.

In addition to personnel of the 9th Medical Supply Depot, a medical supply officer was on the staff of each base section surgeon. These were usually officers of the Medical Corps. Their job was to edit station requisitions, issue supply instructions, coordinate all medical supply activities, work in liaison with the medical supply depot, aid the medical units to eliminate shortages, and render all assistance possible. The base section supply officers worked directly with the theater medical supply officer and implemented his policies and directives. Almost without exception, these untrained officers did a superior job as supply officers.[12]

Medical Supply Problems During Buildup

The first automatic shipments in the form of medical maintenance units were most useful. However, 6 months later, they had outlived their usefulness

[11] (1) Medical Department, United States Army, Organization and Administration in World War II. Washington: U.S. Government Printing Office, 1963, pp. 410–431. (2) Memorandum, Col. William L. Wilson, MC, for General Kirk [TSG], 20 Oct. 1943.

[12] See footnote 9(2), p. 409.

as a sole means of support for theater stocks. The concept of automatic shipments is good (1) if shipments can be complete with no shortages and (2) if replacement factors are carefully and continuously adjusted so that excesses and shortages do not develop. In the Southwest Pacific Area, neither of these two conditions prevailed, and the result was not good.[13]

In the first 6 months of operation, the average medical maintenance unit received was rarely more than 50 percent complete. Shortages, obviously, consisted of those items difficult to procure in quantity to meet demands and were always the same items. Almost as bad were the overages that accrued.

During the first few months of the medical buildup, one of the most frustrating problems was that of table of basic allowance shortages. Medical units were being sent overseas with their table of basic allowance assemblages only 50 to 65 percent complete. The Zone of Interior medical depots backordered the shortages to the units, and as the depots received stocks, coded shipments were made piecemeal to the overseas units. Items were packed in broken-lot boxes, making distribution cumbersome.

The 41st and 32d Infantry Divisions, the first divisions to arrive in Australia, had medical equipment which was not well suited for use in jungle warfare. The substitutive equipment program involved some modification of the medical equipment for these divisions so that it could be used in the Tropics. The experience of Dutch officers who had served many years in the Tropics was invaluable in this matter.

Division surgeons redesigned their medical units for more effective utilization in the Tropics. Requisitions were submitted to the medical supply officer who consolidated them and forwarded them to the Zone of Interior for action. Special drugs and items needed to combat jungle diseases were included. A few items were procured locally. This program took months for successful completion. Mainly, the changes made the equipment more easily portable and waterproof.

Practically all TOE medical units had to be redesigned for use in the Southwest Pacific Area. Fixed hospitals of more then 200 beds were impossible to house in any available existing buildings. The 750-bed evacuation hospital was too large to deploy or transport and had to be broken down into three units of 250 beds each. The medical regiment of World War I, designed to support a square division, had to be completely reorganized.

All this changing of design necessitated much swapping and requisitioning of equipment and supplies. The program was extremely important as units could not operate in many instances until they were reorganized. In spite of exploiting all available local resources, in most instances, equipment had to be obtained from the United States.

In addition to the alteration of existing TOE medical units, new types were adapted for use in this unusual theater. The first of these was a 100-bed

[13] This section is based on a narrative account of medical supply activities in the Southwest Pacific Area prepared for a preliminary draft of this volume by Col. Alphonso M. Libasci, MC, USA (Ret.).

mobile station hospital. In early 1942, the enemy was making such rapid advances in the islands north of Australia that it was feared that the continent of Australia would be invaded. If so, war would be fought in wide open country where mobility would be of prime importance. The medical service had nothing to meet this threat. The 750-bed evacuation hospital required 27 Australian freight cars to move, necessitating two trains. Obviously, something else was needed. Thus, work was begun early in 1942 on a mobile hospital with van units mounted on truck chasses. The unit was to function as a station hospital, using ward tents, but was capable of moving over open country if necessary. If buildings were available, it could function as a fixed hospital.[14]

Much time and effort were devoted to this project. However, progress was slow, and by the time the mobile hospital was ready, the need no longer existed. Australia was never invaded, and the unit was never used as such. Its use in New Guinea was out of the question because of the lack of roads. However, the project was not a total loss as some of the functional vans were later used in New Guinea as fixed units; for example, laundry, generator, and sterilizing units, but on a very limited basis.

The other type of hospital specifically designed for the needs of the theater was the portable surgical hospital. This unit, born of necessity, was designed to fill the need for definitive surgery as close to the front as possible. Hand carries of even less than a mile to airstrip evacuation points over jungle trails were hazardous, time consuming, and often fatal to the seriously wounded (fig. 104).

General Carroll fathered the entire idea of the portable surgical hospital. As originally conceived by him and his professional staff, it would be a hospital that could be carried on the backs of men. When General Carroll first described his ideas, most of the staff were not ready for such a radical and hitherto unheard of concept as carrying a hospital on the backs of its operators! Ultimately, it was designed so that the personnel of 3 officers and 25 enlisted men actually carried the entire hospital on their backs or on litters. The men were handpicked from among the finest and best conditioned in the theater medical services.

Of these units, 36 were assembled from resources within the theater by (1) levying on the larger hospitals both for personnel and for equipment and (2) procuring available items locally. The portable surgical hospitals were an unqualified success in the New Guinea jungles. Later, the concept of total portability was modified and more equipment was added. They were used very effectively in amphibious operations and by the Air Forces to move to remote areas to provide hospitalization.

During early 1942, it was decided to design a so-called jungle kit to be issued to each individual soldier. As finally developed, this kit consisted of a small pouch to be carried on the belt. Components varied from time to time,

[14] A more detailed discussion will be found in Daboll, Warren W.: The Medical Department. The Medical Services in the Asiatic Theater. United States Army in World War II. The Technical Services. [In preparation.]

FIGURE 104.—The transportation of supplies and equipment of a portable surgical hospital, Australia, 1942.

but they basically consisted of antimalarials, water purification tablets, salt tablets, skin disinfectant, insect repellant, vitamins, and so forth. After the kit had been designed and tried, specifications were sent to the United States for its manufacture and procurement in large numbers. The jungle kit was useful and became a standard item of issue (fig. 105).

Jeep litter brackets were developed to adapt jeeps to carry three litters to displace long hand carries. These were extremely useful in forward areas where trails existed. As in all other local procurement endeavors, the Australian military and civilian authorities cooperated fully. Along these same lines

FIGURE 105.—Improvised medical jungle kit made from available material for use in rough jungle combat.

when the threat of enemy invasion was real, plans had been made to convert existing civilian van-type trucks and buses to carry litters. Again, special brackets were designed.

It became obvious quite early in the war that it was poor logic to use glaring white dressings in the jungle where all else was so carefully camouflaged. Accordingly, recommendations concerning the feasibility of dyeing a certain percentage of dressings jungle green were forwarded to the United States. Eventually, the recommendation was accepted. However, the dressings were dyed olive drab instead of green.

When equipment for the portable surgical hospitals was being designed, it was found that the U.S. Army forces had nothing that could be used for a lightweight, portable field sterilizer. The Australians had a small, aluminum, pressure-cooker-type sterilizer weighing 30 pounds with special 9-inch drums that just suited the purpose. This was adopted and procured in quantity. In addition, to obviate the necessity for sterilized dressings in the field in advance areas, dressings were furnished already sterile and sealed in tinplated disposable drums. Three types were available: Basic operating unit, dressings, and gowns. The drums once opened were used as containers in the forward areas.

The weight of the standard litters precluded their use in the portable surgical hospitals. The first such hospitals carried lightweight poles and spreader bars that could be fitted into the loops of cot canvases. This litter weighed 11

pounds complete. Later, sleeves of light canvas, measuring 24 inches in diameter and 84 inches in length with double seams and mattress covers, narrowed by a seam to a width of 24 inches, were fitted over cut poles of various sizes. These were tried and found practical.

The requirements of the theater for lightness, protection against moisture, and ease of portability were never fully met by the Zone of Interior. Much repacking was done in the theater for supplies sent to New Guinea. Many solutions, drugs, and dressings (other than those in waxed containers) were repacked in salvaged cans obtained from hospital pharmacies. The supply of good containers with tight-fitting tops was limited in Australia. Rectangular cans with hinged tops of 1- and 2-quart size and of coated, painted, heavy steelplate were designed and purchased in quantity. Plastic containers would have been ideal. The Japanese used plastic extensively.

The standard Zone of Interior medical maintenance unit was not adaptable for use either in Australia or in New Guinea; therefore, extensive modifications were made within the theater. The modified medical maintenance unit was streamlined to a weight of 7 to 9 tons, instead of the original 15 to 20 tons. The unit was stripped of most nonmedical items such as housekeeping items—mops, brooms, kitchenware, wax, and so forth—of all dental and veterinary instruments, and of most laboratory glassware. The unit was also modified quantitatively, using actual theater experience for maintenance factors.

Medical Supply in New Guinea

The establishment of U.S. Army bases in New Guinea, essential because of its strategic location as a jumping-off place for offensive action against Japan, was a slow and painful process. At times, the postcombat buildup was even more frustrating than the acquisition had been. The first U.S. Army troops arrived on 28 April 1942. Within a year, the organizational structure included the U.S. Advance Base at Port Moresby, with subbases at Milne Bay, Oro Bay, and Goodenough Island (map 30).

The medical supply organization in New Guinea paralleled that on the mainland of Australia. Each base surgeon was provided with a medical supply officer who had to be an aggressive provider of equipment needed by hospital units to fill out their table of basic allowance shortages and provide such equipment as lanterns, generators, and ice cream making machines. For approximately the first year, supply to New Guinea was from Australia. Lateral supply within New Guinea was nonexistent except by a few fast supply boats (fig. 106). As a result, once supplies were dumped into a base port, they remained in that base indefinitely if not used. Thus, it was extremely important that the initial distribution be made accurately and reliably. Needless to say, this idea was never achieved.

Regularly scheduled runs from Australia were out of the question. Medical supplies were loaded on whatever ships became available and whenever space was allotted. On such a catch-as-catch-can basis, things indeed would

MAP 30.—Bases in Papua, New Guinea, 1942–43.

have reached a sorry state had it not been for the two expedients aggressively followed through: (1) A very liberal interpretation of day level and (2) the use of regularly scheduled runs of the intratheater hospital ships to carry cargo forward on return trips to New Guinea.

It became obvious early in the development of the New Guinea bases that the authorized 30-day levels and later 60-day levels of supply would not be adequate in the face of the shipping uncertainties. Therefore, it was decided to raise these levels as it would not involve very large shipping tonnages or warehouse space. Accordingly, more realistic levels were set up, and conditions improved materially.[15]

Early Medical Supply Facilities in Port Moresby

Storage facilities at Port Moresby were practically nonexistent before January 1943. The medical supply depot occupied several small buildings on Ela Beach, the principal dock area 1 mile from the downtown headquarters. Two of these buildings were used for storage and loose-issue operations. Although there were no space, tonnage, or occupancy reports at that time, it was estimated that the total gross space was no more than 4,000 square feet with approximately 80 tons of medical supplies on hand. Any excess amounts of supplies were covered by tarpaulins in open storage.

[15] (1) U.S. Army Services of Supply Bases in New Guinea. [Official record.] (2) Memorandum, Col. William L. Wilson, MC, Lt. Col. Charles G. Gruber, SnC, and Maj. Tolbert H. Belcher, MAC, for Commanding General, U.S. Army Services of Supply, Southwest Pacific Area, through the Surgeon, 27 Sept. 1943, subject: Determination of Maintenance Factors and Rates of Consumption and Expenditures.

FIGURE 106.—Troops loading on an Australian corvette for transfer to New Guinea.

Security storage was, by necessity, improvised. Ethyl alcohol and whisky were stored in a small, detached building of not more than 200 square feet. Original packs of narcotics and other security-type items were stored in an old Army field safe. Refrigerated storage consisted of three or four kerosene-operated refrigerators of the regular household type.

The receiving operations were always accomplished in an open area. Large shipments, if delivered from dockside at a rate which would permit tally-in as received, had to be stored in the open until the receiving crew could segregate the items and remove them to storage. Shortage of personnel and lack of adequate facilities often caused supplies to be merely off-loaded and stacked to contain the entire shipment within available space.[16]

Early Medical Supply Depot Operation

The 3d Medical Supply Depot, commanded by Maj. (later Col.) Stephen G. Asbill, VC, with all of its organizational equipment arrived at Brisbane (p. 406) in December 1942 (fig. 107). Less than 1 month after its

[16] Quarterly Reports, Headquarters, Office of the Surgeon, U.S. Advanced Base [New Guinea], 1 Oct. 1942–31 Mar. 1943.

FIGURE 107.—Interior view of a medical supply warehouse in Brisbane, Australia.

arrival in the theater, the 1st Storage and Issue Platoon, comprising 3 officers and 42 enlisted men, sailed for Port Moresby. Upon arriving on 8 January 1943, it relieved a small detachment of the 9th Medical Supply Depot which had been operating in support of combat elements.

A plan to further deploy the 1st Storage and Issue Platoon by sending one officer and five enlisted men to set up a supply point at Milne Bay and another officer and five enlisted men to do the same at Oro Bay caused a split in the platoon which had been formed to operate as a unit. After a trial period at both Milne Bay and Oro Bay, it became apparent that more personnel and equipment were needed to operate effectively.[17]

MEDICAL SUPPLY IN THE SOUTH PACIFIC

Organization and Purpose

To protect the lines of communication to New Zealand and Australia and to prepare a counteroffensive against the Japanese forces, Army garrisons were established shortly after the Pearl Harbor attack at Auckland, New Zealand; New Caledonia; Efate, Espíritu Santo, and Fijis in the New

[17] Annual Reports, 3d Medical Depot Company, 1943–44.

Hebrides Islands; Tongatabu in the Tonga Islands; Bora Bora; and Tongareva and Aitutaki in the Cook Islands. The South Pacific Area was organized in April 1942, and by July, more than 60,000 troops were in the command.

Estimate of the Situation

Lacking firsthand information on conditions in the area, Maj. Gen. (later Lt. Gen.) Millard F. Harmon, commanding general of all U.S. Army Forces in the South Pacific Area, and several officers had made frequent trips northward to Espíritu Santo and to Guadalcanal in the Solomons to inspect at close range the installations there. Everywhere he went, General Harmon was struck with the shortages in materiel and the inadequacy of facilities. Both General Harmon and Brig. Gen. (later Maj. Gen.) Robert G. Breene, Assistant Chief of Staff for Supply and Evacuation, G–4, realized the many problems in maintaining a steady flow of men and materiel into the area because of the many widely separated island bases.

One of the most serious problems was the shortage of shipping. Unlike a continental theater of operations with debarkation facilities, road nets, and railways, the South Pacific Area, except for New Zealand, had almost no communications or industrial development. In the entire area, only Auckland and Suva in the Fijis had usable terminal installations, and of these, only Auckland could be considered adequate.

Before bases could accommodate large shipments of either troops or supplies, it was necessary to construct harbor and dock facilities. Many islands possessed only the most primitive facilities, or none at all. Roads, warehouses, and storage space so necessary to the operation of a large supply base were nonexistent. To aggravate this situation, there was a notable lack of service personnel of all branches to handle specialized equipment. The original task forces that were hurriedly sent to the South Pacific Area contained a disproportionately high percentage of combat troops who had to be utilized to effect minimum logistical support at each base. This shortage of service elements prevented the construction of adequate facilities for the handling and safeguarding of supplies and resulted in a high degree of waste.

Services of Supply Established

Under normal conditions, the command control of supply of the U.S. Army Forces in the South Pacific Area probably could have been handled through the medium of a G–4 section in General Harmon's headquarters. With the geographic peculiarities of the area and the necessity for close integration with U.S. Navy and Allied supply agencies, however, it was determined that a different type of organization would be required. General Harmon believed that it would have to be large in size, highly executive in character, and headed by a general officer directly under his own command. After studying many plans submitted by his staff, General Harmon established, on 10 November

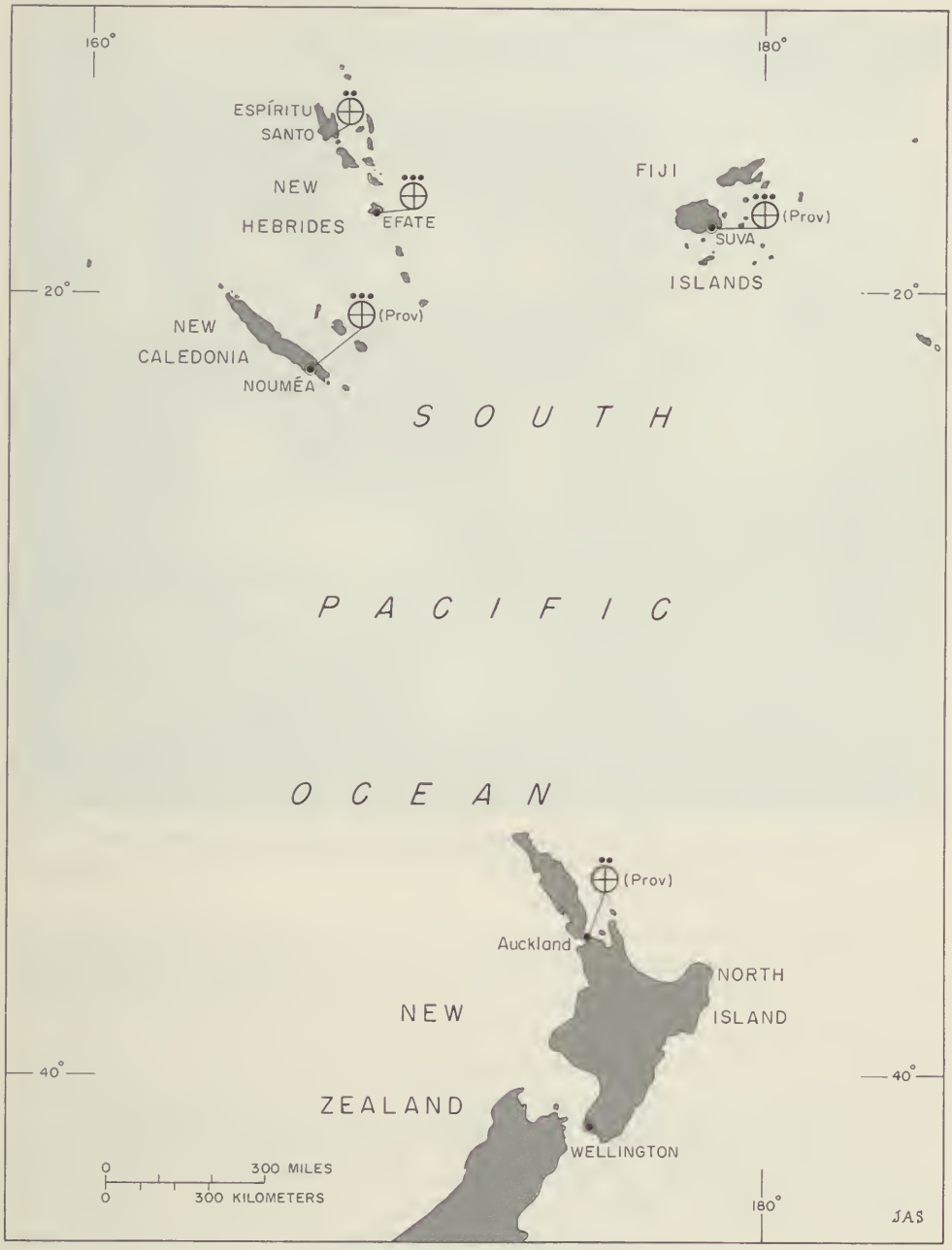
1942, Headquarters, SOSSPA (Services of Supply, South Pacific Area), with General Breene commanding. The original intention of the War Department was to establish the headquarters for the U.S. Army Forces of the South Pacific Area in Auckland. General Harmon, however, chose to locate his advance echelon at Nouméa, New Caledonia, to be close to the scene of operations and the theater commander.

Initial Problems in Medical Supply

No table of organization medical supply units were sent to the South Pacific Area during the first year of the war, and no officer trained in medical supply was assigned to the staff of the Chief Surgeon, Col. (later Brig. Gen.) Earl Maxwell, MC, USAF. Shortly before Headquarters, SOSSPA, was organized in Auckland, 1st. Lt. (later Lt. Col.) Joseph C. Thompson, MAC, was transferred from the 43d Infantry Division to Headquarters, USAFISPA (U.S. Army Forces in the South Pacific Area), and assigned duties as the theater medical supply officer. At the time that the headquarters moved from Auckland to Nouméa some 45 days later, the medical supply staff in the surgeon's office consisted of Lieutenant Thompson and one sergeant; all files of this office were carried in one briefcase. Nevertheless, this organization immediately took steps to organize an orderly system. In the absence of table of organization supply units, provisional units were organized at Nouméa, Efate, and Suva by drawing personnel from medical units at these bases. Smaller provisional supply detachments were established at Espíritu Santo and Auckland map (31). The first mission of these provisional units was to call in all medical supplies (principally medical maintenance units) in the hands of the various task forces to establish central medical depots.

With the exception of Auckland, Nouméa, and Suva, warehouses or other storage facilities were nonexistent, and storage of supplies was necessarily in tentage or in open storage covered by salvaged tents or whatever canvas was available. Because of high humidity and exceedingly heavy rainfall, supplies at many bases were lost or deteriorated beyond use as a result of this lack of proper storage facilities. Labels became unreadable or fell off the containers entirely, leaving no choice but to destroy the contents. Metal components of equipment became rusted or corroded, and fungus grew on certain optical items.

Inexperienced supply personnel assembled from other units frequently distorted the supply levels available at each base. All bases received medical maintenance units and, in general, were able to maintain adequate supply levels. Drugs for the most part were available although false indications of shortages existed in certain bases due to the personal preferences of many medical officers who were not accustomed to using substitutes. There were, however, some items of special benefit in this area which were left out of the medical maintenance units or were included in inadequate quantities. This was especially noticeable in the many vitamin products and in most of the newer sulfanilamides, but to a lesser degree in the arsenicals. Clinic equipment, such as instru-



Map 31.—South Pacific supply points, 1942.

ments for the eyes, ears, nose, and throat, and replacements of surgical equipment were very short. Special technical equipment such as microscopes and ophthalmoscopes was not sufficiently plentiful in the early stages.

Few of the medical organizations shipped to the South Pacific Area were able to function without changes in their organization and equipment. The very nature of the theater—numerous small islands widely separated from each other and varying in climate from the Temperate Zone of New Zealand to the tropical areas of the Solomon Islands—made these changes mandatory. Revisions varying from minor items in some units to almost complete reorganization in others were necessary. In many instances, a hospital would be the only medical complement in a task force isolated by hundreds of miles. It, therefore, became necessary for this hospital to function as a collecting company, a clearing company, a general hospital, and, in some instances, as the task force surgeon's office. The most serious handicap in this situation was the lack of adequate equipment. Many times, evacuation hospitals were required to function as station or general hospitals, and medical field units such as battalions or regiments were forced to operate hospitals. This required provisional reorganization and equipping of these units.

To compound these problems, units arrived in the area without parts of their essential table of basic allowance equipment while many items were lost on the docks or beaches due to limited control of unloading facilities. If an item was hauled to the wrong unit, there was little or no chance of subsequently locating it. The small medical depots established on the various islands did not have sufficient stock or, in many cases, no stock at all of the items necessary to replace shortages. Other difficulties were encountered when the equipment was placed on different ships than the personnel. Many times, the personnel were diverted to one island and the equipment arrived at another; due to lack of intratheater shipping, the final marrying-up of the unit and its equipment sometimes was never accomplished.

Among the first medical supply installations to arrive in this theater was one section of the advance depot platoon of the 10th Medical Supply Depot. This organization originally arrived in Auckland on 22 November 1942 and was soon transferred to Espíritu Santo. One section of the advance depot platoon of the 17th Medical Supply Depot was activated on New Caledonia from personnel available within the command (fig. 108). A small detachment designated as Medical Detachment No. 1 (Supply) was established at Suva. These were the only officially organized supply units located in this theater in the initial phase of its operation.

Medical Supply Levels

The supply facilities on Fiji, New Caledonia, and Efate, as well as the smaller supply points at Espíritu Santo and Auckland, were receiving automatic medical maintenance units and were able to maintain their supply levels between 100 and 200 days. Frequently, these levels varied because units which

FIGURE 108.—U.S. Army medical supply depot in New Caledonia, 1942.

had lost all their equipment had to be resupplied. Also, it was hard to calculate exact supply levels because of certain shortages and excesses.[18]

Stock Control

The geographic conditions peculiar to the South Pacific Area and the shortage of supervisory personnel in the headquarters element required that decentralization be the keynote for medical supply in the area. The advantage of centrally located issuing points was recognized, but their establishment in this theater was clearly impracticable because of the chronic shortage of personnel and intratheater shipping at the outset. As a result, until January 1944, most supplies were shipped in the form of medical maintenance units from the San Francisco Port of Embarkation directly to the island where they would be consumed. Requisitions were transmitted to the

[18] (1) See footnotes 2(3), p. 397; and 14, p. 414. (2) Annual Report, Surgeon, South Pacific Area, 1942.

port for items not contained in the medical maintenance units or for inadequate quantities in them.

Because of the widely separated island bases and shortage of transportation, frequent inspection trips for supervision by Headquarters, SOSSPA, were not possible. Therefore, all depots were placed under the administrative control of the island base, and in many cases, each island base had different ideas concerning the control of these supply installations. On one of the infrequent inspection trips, however, Captain Thompson noticed that, in addition to some shortages, excesses were accumulating on certain items in the medical maintenance unit. For example, on Guadalcanal, the supplies of blood plasma, intravenous fluids, morphine Syrettes, and antidiarrheal drugs were inadequate while cotton, glycerin, castor oil, ether, ammoniated mercury, and salicylic acid had built up huge excesses.

Trips to the other island bases in this area confirmed that certain items supplied in the medical maintenance unit were accumulating large excesses, but the filing of reports proved an inadequate remedy. After considerable correspondence between the theater, the San Francisco Port of Embarkation, and the Surgeon General's Office, only token relief was received, and some excesses continued to accumulate.

The smaller and more eastern islands of the South Pacific Area (Tongareva, Bora Bora, Aitutaki, and Tongatabu) were placed on a requisition basis in 1943. This was at the suggestion of the San Francisco Port of Embarkation because these islands were occupied by only one medical installation and usually small task forces, and it was unsatisfactory to supply them through the medium of fractions of a medical maintenance unit.[19]

Optical Activities

In the fall of 1942, one of the major medical supply problems of the South Pacific Area was that of replacement and fabrication of spectacles. Generally, prescriptions for spectacles were received at the medical supply section of the surgeon's office, Headquarters, SOSSPA, and forwarded directly to the Joint Purchasing Board in New Zealand, where arrangements had been made for the fabrication of spectacles by civilian facilities. It soon became evident that the demand far exceeded the New Zealand capability and that optical-repair sections of medical supply depots were needed in the South Pacific Area.

The first such unit was the optical-repair section of the incomplete 17th Medical Supply Depot in New Caledonia. This unit was established late in 1942 from personnel available to the command. Through the cooperation of G–1 Division, Personnel, War Department General Staff, records of many units were screened, and men with optician's background were located. A noncommissioned officer who was a bandsman assigned to one of the bands

[19] Essential Technical Medical Data, South Pacific Area, U.S. Army, initial report, dated 17 Sept. 1943.

in the Americal Division was found by this survey. It was soon discovered that he possessed an ideal background in optical repair and fabrication and was subsequently commissioned a second lieutenant in the Medical Administrative Corps, becoming the first optical-repair officer in the South Pacific Area. The depot, its equipment augmented by a spherical surfacer, was soon repairing or fabricating an average of 800 pairs of spectacles each month.

The base platoon of the 11th Medical Supply Depot which arrived in the theater in August 1943 included the personnel but not the equipment of an optical-repair section. When the platoon rejoined its parent unit in the European theater, these personnel were utilized to augment the already existing optical-repair shop, and additional equipment was requisitioned. When the equipment arrived, however, it was shipped to Guadalcanal, and personnel were transferred there to operate an optical-repair shop.[20]

Maintenance and Repair

Before the arrival of the base platoon of the 11th Medical Supply Depot, there were no maintenance and repair facilities within the theater other than those organized provisionally on various island bases. For the first time, two trained enlisted instrument repairmen were available for utilization. However, lack of spare parts, particularly for sterilizers and X-ray equipment, greatly limited their utilization.

The lack of intratheater shipping also limited the ability to return items to this one source for repair, and many times, it was more practicable to send repairmen to a forward base than to return the equipment to the depot.[21]

MEDICAL SUPPLY ACTIVITIES IN ALASKA DURING THE DEFENSE PERIOD

Prewar Expansion of U.S. Forces

Early in 1940, the strategic significance of Alaska[22] was recognized, and by late June, additional troops were dispatched to Fort Richardson, near Anchorage. The 1940 augmentation consisted of one battalion of infantry, a field artillery battery, an engineer company, a quartermaster detachment, and an ordnance detachment. Medical support came from 10 enlisted men who comprised the medical detachment of the 4th Infantry Division and 20 enlisted men from Fort Missoula, Mont., and Letterman General Hospital, San Francisco. Three Medical Corps officers and one Dental Corps officer had been scheduled to accompany the group, but only the dental officer received orders

[20] See footnote 17, p. 420.

[21] Essential Technical Medical Data, South Pacific Area, U.S. Army, for February 1944, dated 7 Mar. 1944.

[22] This section on medical supply activities in Alaska during the defense period is based on McNeil, Gordon H.: History of the Medical Department in Alaska in World War II (1946). [Official record.]

in time to get to Seattle, Wash., for the embarkation. Consequently, several hours before personnel boarded ship, a medical officer on duty at the station hospital at Fort Lewis, Wash., was given verbal orders, later confirmed in writing, to proceed to Alaska with the movement; after packing a few personal effects, he joined the medical detachment as its surgeon. Medical supplies and equipment consisted of the following Medical Department chests: Two No. 1, one No. 2, one No. 4, and one No. 60 (dental), together with litters, blankets, and special drugs and supplies.

Organization of Medical Supply Following Pearl Harbor

The medical service of the Alaska Defense Command was organized on 12 December 1941, following the appointment of Lt. Col. (later Col.) Luther R. Moore, MC, as surgeon. The echelons of medical supply in the Alaskan theater originally were, as follows: Unit supply officer, post medical supply officer, and the Overseas Supply Branch, Seattle Port of Embarkation. From the Seattle Port of Embarkation or the Prince Rupert Sub-Port of Embarkation, Prince Rupert, Alaska, units arriving in the theater usually landed fully equipped with supplies for the initial period, plus additions for a special tactical situation. At each station, the post medical supply officer also served as the station hospital medical supply officer. Most items were furnished automatically by the medical maintenance unit. Those authorized items not included were requisitioned directly from the Seattle Port of Embarkation.

Storage of Medical Supplies

The provision of adequate storage facilities was essential because of the climatic conditions. Much loss was sustained at Adak (map 32), where large amounts of supplies were dumped on the wet ground and exposed to the elements because of a lack of storage space. It was often necessary to store medical supplies in tents, which proved unsatisfactory because of wind, rain, and snow.

Once initial construction was completed at new stations, adequate warehouse space became available. Storehouses were generally constructed of wood, either as part of the hospital or as separate huts. The quonset hut was also unsatisfactory because of sagging floors, leaky roofs, and lack of perpendicular walls. Each station hospital was authorized 35 square feet of storage space for each authorized bed.

Weather conditions made it necessary to store freezable supplies in heated buildings, thus requiring constant supervision and maintenance. At Naknek, supplies froze on the shelves despite the fact that the buildings were heated. Tests were conducted in February 1943 to determine the effects of freezing on medical supplies. Results of the tests, which showed most items were not affected, were reported to The Surgeon General.

Heavy rainfall and resulting dampness required additional special consideration for medical supplies and equipment, X-ray films, and plaster of

Map 32.—Supply points in Alaska, 1942.

paris bandages; other similar items often deteriorated and became mildewed, thus necessitating that buildings be heated intermittently to reduce dampness.

Dispersion of Supplies

Upon declaration of war, a policy of dispersion of reserve supplies was invoked. Later, all supplies were dispersed in a uniform manner. This dispersion was conducted in various ways. At Fort Richardson (map 32), established in June 1940, pyramidal tents, dugouts, basement rooms, and even the Eklutna Indian School which was located 27 miles from the post, were utilized for storage.

Because of the distance between stations and the lack of dependable transportation, often handicapped by bad weather, the medical maintenance unit proved valuable in supplying inaccessible spots. Ship sailings were irregular, and air service was generally unavailable except for special items. These transportation difficulties made it necessary to improvise during 1942 to make up for the shortage of field equipment.

Lack of a Medical Supply Depot

There was no regularly established medical supply depot in the Alaskan theater. Fort Richardson served as an unofficial depot. Stations possessing ex-

cesses of critical items and medical chests shipped them to Fort Richardson, where two buildings were designated as warehouses with two officers and eight enlisted men as depot personnel.

The Optical Program in Alaska

In February 1942, to speed up the procurement of Government-issued spectacles, a procedure was inaugurated which equipped five of the larger stations with the necessary equipment and materials. Spectacle order forms were prepared and forwarded to the American Optical Co., at Seattle, and the spectacles were returned by the Seattle General Depot.

This system suffered several defects: (1) Excessive length of time required to fill an order, (2) losses incurred because of movement of personnel, (3) lack of control for procurement, (4) lack of prompt communication on special cases, and (5) lack of trained personnel and equipment in the command. To remedy this problem, traveling optical teams were organized and sent to stations requiring their services. This became a rather complete service in 1942.

The problem of filling prescriptions and providing a prompt supply of spectacles remained until a fixed-optical unit was assigned to Fort Richardson in April 1943. By June, all initial issue, replacement, and repair of spectacles for the entire command was accomplished by that unit.

CHAPTER XIII

Offensive Operations: The Solomons to the Palaus

SOUTH PACIFIC AREA

Halting the Japanese Offensive

Because of the Japanese activities at Lae, New Guinea, and Guadalcanal in early 1942, it became obvious to the Allied Command that it would be necessary to launch a counteroffensive to reverse this trend and relieve the apparent threat to Australia. The U.S. Marines opened the campaign on Guadalcanal some 8 months after Pearl Harbor on 7 August 1942, and the 16th Infantry Regiment of the Americal Division entered the scene on 13 October 1942. Other combat elements of the Americal Division, including the 101st Medical Regiment, arrived on Guadalcanal on 11–12 November 1942.

The medical supply section of the 101st Medical Regiment assumed responsibility for medical supply on Guadalcanal, including the support of certain Navy and Marine personnel. Fortunately, the Americal Division, at the time, carried a 60-day supply, and no serious shortage was caused by this added burden. The only supplies really low were glucose, plasma, and sulfaguanidine. The 101st Medical Regiment was relieved of its supply responsibility for the base on 4 January 1943 with the arrival of Section 1, Advance Depot Platoon, 21st Medical Supply Depot (map 33).

Col. Dale G. Friend, MC, Surgeon, 101st Medical Regiment, made some significant recommendations concerning medical supply on Guadalcanal. Because it was necessary to supply Navy and Marine personnel as well as the Army, the 60-day supply level proved to be inadequate. Colonel Friend recommended that equipment of medical troops assigned to combat operations be made available in small portable waterproof containers which would be capable of floating reasonable periods of time in the event that they would be used in landing operations and river crossings.

Because plasma bottles and other glass containers were being shattered by mortar and artillery fire as well as bombings, it was recommended that these items be placed in shock-absorbing containers. It was also recommended that the new Army-issue and the Navy-type litters replace the cumbersome Army-issue oak litter.

Development of Field Equipment

The combat plan to meet and destroy the enemy, wherever found, meant that units would be sent into difficult jungle country, remote from

MAP 33.—Medical supply support on Guadalcanal.

sources of supply. This problem was solved by combining Navy, Marine, and Army field equipment. It was found that the Navy and Marine valise-type medical chest was extremely advantageous in that it could be carried by one man on the foot marches and contained sufficient equipment to provide for treatment. Another important item was the so-called combat dressing chest which was made up of two watertight tin cans containing various types of dressings. These cans together fitted in a canvas carrying case which one man could carry. Due to the shortage of this particular item, the cans were forwarded from the collecting station by litter bearer, emptied at the aid station, and then returned to the collecting station for refilling.

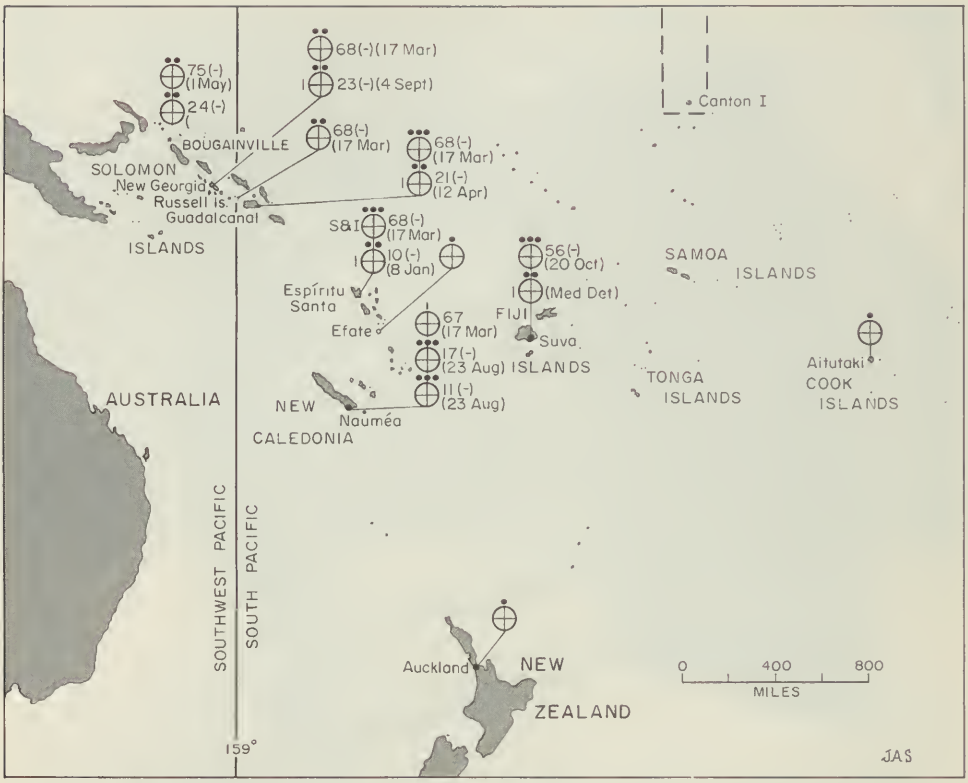
It is interesting to note that two types of jungle kits (fig. 109) were added to the medical supply catalog shortly after the battle for Guadalcanal.[1]

Supply Points and Storage Facilities, 1943

Late in 1943, there were eight medical supply points in USAFISPA (U.S. Army Forces in the South Pacific Area). These points, each operated by a particular section or detachment of a medical supply depot, were located on Espíritu Santo, Fiji, Bougainville, New Caledonia, and Guadalcanal Islands. The South Pacific General Depot at Nouméa, New Caledonia,

[1] (1) Daboll, Warren W.: The Medical Department: Medical Service in the Asiatic Theater. United States Army in World War II. The Technical Services. [In preparation.] (2) Annual Report, 101st Medical Regiment, South Pacific Area, 1942. (3) Whitehill, Buell B.: Administrative History of Medical Activities in the Middle Pacific. [Offical record.]

FIGURE 109.—A. Individual jungle kit used in the Pacific areas. B. Another version of the jungle kit.



Map 34.—Medical supply points, Bougainville and the South Pacific Area, 1943–44.

was organized in August 1943 and was operated jointly by the base platoon of the 11th Medical Depot Company and a section of the 17th Medical Depot Company. This depot held a 30-day reserve supply for the entire theater (map 34).

By December 1943, approximately 128,000 square feet of warehouse space was available in all depots of the South Pacific. There was also 26,000 square feet of storage under canvas (fig. 110). The prefabricated wooden warehouses of New Zealand were easily erected, but of the six warehouses constructed, only two had concrete floors. Only a limited amount of materials-handling equipment and only a few forklifts and trucks were available.

The lack of floors created an additional problem, the securing of dunnage. Approximately 35,000 square feet of dunnage was constructed from scrap lumber at the South Pacific General Depot. The necessary power equipment needed to convert boxes and crates to dunnage was not always available and had to be obtained in the same "informal" way in which the lumber was secured. Depots in forward areas often used coconut tree logs, crushed coral, and ships' dunnage for flooring.

Prefabricated warehouses were not used on Guadalcanal. The limited stock available was being held for shipment to more forward areas as combat

FIGURE 110.—Storage of medical supplies under canvas, 68th Medical Depot Company, Guadalcanal.

continued to move north and west. Outside storage was, at its best, a poor substitute. Originally, supply of tarpaulins was very short, and many supplies were lost in open storage in forward areas due to lack of covering. By the end of 1943, this condition had been corrected, and all storage was under some type of covering (fig. 111).

Protection of alcohol, narcotics, and precious metals, although not completely adequate, presented no insurmountable problems. Generally, "strong rooms" in the area consisted of wire mesh enclosures. The shortage of lumber, cement, and other building materials prevented construction of more adequate protective storage areas in most depots. In the Guadalcanal Depot, it was necessary at times to place alcohol in outside storage. When this became necessary, armed guards were posted. Major loss of these supplies was never a serious problem, probably because all personnel were so actively engaged in the support of combat, coupled with the fact that no civilian market existed for its disposal.[2]

[2] This section is based on a manuscript covering medical supply in the South Pacific prepared for a preliminary draft of this volume by Col. Joseph C. Thompson, MSC.

FIGURE 111.—Native-type warehouses, constructed under the direction of the Corps of Engineers, provided more protection than did canvas.

Automatic Supply Discontinued

The discontinuance of the automatic supply of medical maintenance units was followed by direct requisitioning in January 1944. Better stock control, curtailment of overages and shortages, and a system of stock reporting followed.

Requisitioning of supplies was closely coordinated by Headquarters, USASOS (United States Army Services of Supply), South Pacific Area. The current status of a requisition could easily be determined because of the use of an information copy furnished the base concerned.

Late in 1944, it was required that stock level reports be filed at 10-day intervals. This gave the theater medical supply officer a system of central stock control. Lack of personnel in the depots and the headquarters as well somewhat handicapped this system. By May 1945, the theater reverted to a decentralized system.

Levels of Supply

With the discontinuance of the medical maintenance unit shipments, supply levels had to be reset. A 150 days' supply was to be on hand in depot stock, and 30 days of reserve stock in the form of medical maintenance units was to be held by the South Pacific General Depot. This plan gave the theater a total requisition objective of 300 days.

Reorganization of Supply Units

Early in 1944, following recommendation of the War Department, the base platoon of the 11th Medical Supply Depot and Section 1, Advance Depot Platoon, 17th Medical Supply Depot, along with its optical repair section, were reorganized into the 67th Medical Depot Company. The depot units on Guadalcanal and the other island areas were also reorganized, leaving the base platoon of the 68th Medical Depot Company on Guadalcanal, the Storage and Issue Platoon of the 68th on Espíritu Santo, and sections of the 75th and 56th Medical Depot Companies on Bougainville and Fiji, respectively. The medical supply situation at the smaller stations on New Georgia and the Russells was handled by small detachments of one officer and four to eight enlisted men while the medical supply officers of individual base hospitals at Auckland, New Zealand, Aitutaki, and Efate handled all local supply problems (map 34).

On 15 June 1944, the islands in the Solomon group, north of the Russells, were designated as part of the Southwest Pacific Area, and on 1 August 1944, Headquarters, USAFISPA, became the South Pacific Base Command.

This reorganization did not change the logistical mission of the command. The three points of discharge, New Caledonia, Espíritu Santo, and Guadalcanal, remained the same. All requisitions for the other island bases were filled from stocks within the area, and supplies not available in the base command were extracted to the San Francisco Port of Embarkation.

By the last quarter of the year, the planning for the redeployment of the troops of the area became paramount. Reduction in strength at bases and the closing of some bases required constant coordination for the supply of these units. The area had reached its peak in the last quarter of 1943 and the first half of 1944. Diversity of climate and distance between islands were still factors to be considered in supply. Only after the withdrawal of the larger organizations, followed by some of the hospitals, and the closing of some islands in the eastern part of the area, did this situation become less complex.

Refrigeration.—Refrigeration in general was lacking in the early days of the South Pacific Area. By the end of 1943, walk-in-type refrigerators were available and utilized at all depots. The original refrigerator authorized to medical supply depots by the TOE's (tables of organization and equipment) was inadequate, but in emergencies, proved valuable for short periods of time until the walk-in type could be obtained and erected.

Rehabilitation.—Many combat divisions, when relieved from actual combat, were rehabilitated in New Zealand and other bases in the theater. In order not to affect the level of supply at these bases, modified medical maintenance units were assembled and shipped to these divisions by the medical section of the South Pacific General Depot when necessary.

From time to time, modified medical maintenance units were assembled at the various depots where they were segregated, marked, and designated for

task forces to be mounted-out at that base. These units were turned over to the task force at the time of embarkation.

End of combat.—Early in 1944, the military situation in the South Pacific Area had well passed its climax. Guadalcanal, New Georgia, and many other islands were names indelibly written in history. Passage of time had created a complete change in the picture for the entire South Pacific Area, from a combat area to an area whose mission was that of logistical support.

NEW GUINEA CAMPAIGNS

While Marine and Army units were driving the Japanese from Guadalcanal, American and Australian forces were involved in a long hard struggle to eliminate the possible threat to Australia from New Guinea.

Depot Operations

Through most of 1943, the entire load of medical depot operations for the SWPA (Southwest Pacific Area) was carried by the 9th and the 3d Medical Supply Depots (map 29). To maintain a supporting position, by 1943, these units were spread along the eastern coast of Australia and New Guinea. Parent units split off platoons; platoons sliced off sections; and even sections divided into still smaller detachments. Personnel was augmented, organization and equipment modified, until all resemblance to a table of organization vanished. This fragmentation was necessitated by the number of locations and movements and the fact that the existing TOE for medical supply depots was totally unsuited for operation under the conditions existing in New Guinea and Australia.

Port Moresby Depot.—To say that storage facilities in the Southwest Pacific Area were inadequate would be a gross understatement. The best understanding of conditions as they existed in Australia and New Guinea came from Lt. Col. Stephen G. Asbill, VC, 9th Medical Depot commander. "Storage facilities in Brisbane, Australia," he wrote, "were much better than in New Guinea, but still were far from ideal. By early 1944, the depot was operating from 12 widely separated storage facilities, one 60 miles from Brisbane. These varied from a basement of a church to college buildings. Very few were real warehouses able to support heavy loads; none were modern fireproof buildings. It was not possible to use materials handling equipment (even if it had been available)."

Storage facilities at Port Moresby were practically nonexistent in January 1943, and there was little improvement for the next 8 months. The medical depot occupied several small buildings on Ela Beach, the principal dock area, approximately 1 mile from the downtown headquarters. Two of these buildings were used for storage and loose-issue operations. Although there were no space, tonnage, and occupancy reports at this time, it was roughly estimated that the total gross space was no more than 4,000 square feet, with approximately 80 tons of medical supplies on hand. When the tonnage on hand exceeded the stor-

age capacity, it was stored in the open and usually covered at night with tarpaulins. A locator system was not used because of the limited and crowded space. Stock selection under such conditions was not too efficient or systematic.

Security storage in New Guinea was improvised. A small detached building of not more than 200 square feet was used for storage of ethyl alcohol, original cases of whisky, original packages of narcotics, and other security-type items. Opened containers of these items were stored in an old Army field safe. Although security was thus minimal, little difficulty was encountered in handling these items. Refrigerated storage consisted of three or four kerosene-operated refrigerators of the regular household type.

The receiving operations were always accomplished in an open area. If the shipment was small, there was no problem. It could be quickly documented and placed in storage. Larger shipments, if delivered from dockside at a rate which would permit tally-in as received, had to be stored in the open until the same receiving crew could segregate items and remove them to more adequate storage. There were numerous occasions, after shipments began to arrive directly from the United States, where there was no control over rate of arrival of trucks from dockside. At times, it was necessary to split a handful of men into two crews so supplies could be received at night as well as in the daytime. Under such circumstances, because of the shortage of personnel and lack of adequate facilities, supplies were merely off-loaded and stacked in an effort to contain the entire shipment within available space, with no attempt at identification.

As the total tonnage increased, it was imperative that additional storage space be obtained. Through efforts of the command surgeon, three former Australian troop barracks, located approximately 3 miles from the main operation, were allocated for medical supply. Each was 20 by 100 feet with a center walkway approximately 24 inches lower than the main floor running the length of the building. Depot personnel immediately modified these structures so that the entire floor would be at one level. To provide additional relief for the storage problem, three hospital ward tents were erected in the same area and used for about 2 months.

After about 9 months of improvising in every conceivable manner, a suitable central location for the depot was selected and approved. This required site preparation by Engineer units and then the construction of prefabricated buildings. The construction was accomplished by depot personnel assisted by personnel from a nearby medical facility which was not operating at full capacity at the time.

Brisbane Depot.—From 1 January to 31 October 1943, the Brisbane Depot (fig. 112) received 4,511 tons of medical supplies and shipped 3,723 tons. Although the tonnage was relatively small, it required a large number of men for handling since no equipment, such as forklifts, tractors, warehouse mules, or pallets, was available. All boxes were manhandled from the time they were unloaded at the dockside until they were loaded back on board ship, including stacking to heights of 15 to 20 feet when the ceiling would permit and the floor-

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FIGURE 112.—Interior view of the 3d Medical Supply Depot, Brisbane, Australia.

load would allow. This organization worked 24 hours a day when ships were unloading medical supplies, which was about 50 percent of the time. The officers unloaded and manhandled boxes just the same as enlisted men and were authorized just as many sets of fatigues. In addition to the standard medical supply responsibility, the Brisbane Depot organization handled laundry exchange for hospital ships that put into the port, hospital trains operating along the coast of Australia, and hospitals located in the Brisbane area. The unit also handled local purchasing of medical supplies, surgical instruments, and dental instruments, procuring approximately $15,000 per month during the first 6 months.

Deployment of Supply Units

Having spent a brief trial period at Milne Bay and Oro Bay, New Guinea, in late 1942 and early 1943 (map 29), the 3d Medical Depot Company realized the urgent need for additional personnel.

In addition to accomplishing the supply mission, the depot personnel at Oro Bay were assigned small arms security for 400 yards of the beach area adjacent to the depot. Several more men were sent from Port Moresby to Oro Bay and one or two to Milne Bay. This action, together with normal losses, reduced the Port Moresby force to a low of 23 men at one time.

Map 35.—Medical supply depots in Australia, 1943.

With the increase in combat activity in the spring of 1943, the volume of incoming supplies began to increase and additional units were arriving and increasing the population to be supported. The problem was presented to the base surgeon who was successful after a few weeks in getting enough men assigned to bring the strength back up to 32 men. Because of the situation which prevailed, little thought was given to TOE authorizations. The major consideration was the problem of obtaining the number of personnel and equipment required to support the assigned mission. This was the situation for 9 months, after which the Port Moresby remnant of the original platoon was replaced by another platoon from the parent unit in Australia. A few weeks later, the detachment divided between Milne Bay and Oro Bay was also relieved, and all returned to Australia for recuperation and reassignment to the parent organization.

Augmentation of supply units.—Before the departure of the 1st Storage and Issue Platoon for Port Moresby, plans were taking shape for assignment of the entire depot. The headquarters and base section remained at Brisbane, Australia; one storage and issue platoon was sent to Townsville and one to Rockhampton. Detachments were located in Toowoomba, Cairns, Charters Towers, and Darwin (map 35). With the three locations in New Guinea, a depot organized to operate in four locations was now operating in 10 widely

scattered areas. Authorized personnel and equipment could not begin to cope with the situation. Consequently, additional personnel were assigned as required, when available, without regard to TOE authorization. On the Australian mainland, military personnel were augmented by civilians recruited under a joint agreement and administered under a system somewhat similar to Civil Service procedure, but much less complex.

This situation was particularly true at Brisbane where, at the peak period, approximately 35 Australian civilians were assisting the headquarters and base section in all sorts of jobs, such as stenographers, clerks, stock selectors, warehousemen, and ordinary laborers. Practically all of the work of posting to the stock record account and maintaining voucher files was performed by Australian girls. In the islands between Australia and the Philippines, any indigenous personnel recruited were strictly laborers. Native potential as a labor force, however, was very limited because the average native of islands like New Guinea and Biak was small of stature, undernourished, either diseased or weakened from disease, and unaccustomed to sustained periods of manual labor. Their habits and living conditions were strictly primitive.

Depot equipment.—Equipment was obtained by each separate unit or detachment on an issue or loan basis, depending on its assigned mission and justified by the type and volume of work to be done. Each platoon, detachment, or task group operated almost entirely independently from the parent unit in this respect since each was supporting different areas separated by a distance of 50 to 1,000 miles or more.

Two small powersaws were obtained in the United States. One, retained by the base section, was very valuable as it enabled assigned personnel to make full use of all salvageable lumber to construct crates, boxes, and shelving, to fabricate items for various uses in offices, and to improve living conditions in the field-type bivouac area. The other powersaw was taken to Port Moresby by the 1st Platoon of the 3d Medical Depot and was put to a similar use. It was not possible to keep the existence of such a piece of equipment a secret, and as soon as other units learned of it, there were numerous requests for a loan. Within a few months, it was worn out and there was no replacement parts.

In the later phases of the operations in Australia, when the base headquarters staff finally had time to require a review of status of equipment in units, the medical depot was authorized to retain many items of equipment not on its TOE and twice the quantity of many authorized items. This was based on a justification, and recognized by the staff, that the depot was operating 100 percent in excess of the mission as contemplated by the TOE. After equipment became available in the theater, most of the things which were necessary for the assigned mission were obtained, but there was an initial period when operations suffered for lack of this equipment, special tools, and power tools. Also, there was practically nothing authorized for operation of a maintenance shop.[3]

[3] (1) Quarterly Reports, 9th Medical Supply Depot, Southwest Pacific Area, 1943. (2) Quarterly Reports, 3d Medical Supply Depot, Southwest Pacific Area, 1943. (3) Personal recollections of Lt. Col. Stephen G. Asbill, VC, Commanding Officer, 3d Medical Depot Company.

Obtaining Supplies From the United States

Initially, all maintenance supply (class I) from the United States was on an automatic basis by means of medical maintenance units. Classes II and IV medical supplies were obtained by requisition based on TBA (table of basic allowances) shortages for class II and 180 days' level for class IV. In addition, theater levels of certain critical items which were frozen for use only, as the name implied, were shipped on an automatic basis from the United States as the Final Medical Reserve. Automatic shipments of medical maintenance units were discontinued in late 1943 and those of Final Medical Reserve units in early 1944. Stocks of the latter were absorbed into ordinary theater stocks. It must be realized that a comprehensive central stock record system was maintained to compute theater requirements and prepare requisitions. This necessitated monthly postings based on inventory reports received from all depots, due-in records, maintenance factor cards for each item, troop strength projected at least 6 months in advance, and TBA consolidated shortages. These centralized stock control records were, of course, also useful for balancing stocks within the theater and for extracting.

This central stock control system was difficult, time consuming, and an onerous task using "hand" methods. Electric accounting machines for the Supply Division would have been welcomed.[4]

An extremely important facet of computation of requirements was the problem of adjusting replacement or maintenance factors. No resupply system can be any more efficient or accurate than its maintenance factors. At the beginning of the war, maintenance factors were inadequate and inaccurate for use in the SWPA. Many examples of gross inadequacies were detected. Certainly, one of the most vital functions was the continuing readjustment of maintenance factors based on actual consumption.

On the whole, the Zone of Interior did a good job in getting medical supplies to SWPA. There were a few items which plagued the theater from the beginning to the end of the war. Among the most troublesome and frustrating shortages throughout the entire war were Atabrine (quinacrine hydrochloride), foot powder, litters, penicillin, some dental items, especially burrs and handpieces, and spare parts of all types.

The "battle" to keep Atabrine levels up to theater requirements was a bitterly contested one. It was a hand-to-mouth-type existence. Shortages were always threatening, but, somehow or other, help always arrived at the last moment. This was not entirely due to failure of the United States to send Atabrine in sufficient quantities. Theater shipping, unloading, and distribution inadequacies caused some of the trouble, as did stowage in ships. It was not unusual for 50 ships to be backlogged in a New Guinea port. It was almost certain that there was Atabrine on many of these ships. Because of the backlog

[4] (1) Essential Technical Medical Data, U.S. Army Services of Supply, Southwest Pacific Area, for March 1944, dated 1 Apr. 1944. (2) Preliminary draft of Medical Supply History, Services of Supply, Southwest Pacific, by Col. Alfonso M. Libasci, MC.

and because Atabrine was stowed far down in cargo hatches, it was not possible to get to it. In this situation, an emergency air shipment from the United States was necessary to prevent a serious shortage. Another paradox was that the Australians always had enough Atabrine and, on many occasions when called on, would lend us all we needed. They obtained it on lend-lease from the United States!

Foot powder, although the allowance per 1,000 men per month was steadily increased from 75 cans at the beginning of the war to 1,000 cans near the end of hostilities, was never available in the quantities needed. Shortage of this item seemed to cause more concern and more complaints than any other in the entire theater. Letters, radiograms, and reports of visitors and inspectors were replete with concern over foot powder. In the Tropics, the constant moisture caused the skin of the feet to be extremely susceptible to fungus infection. Adequate use of foot powder greatly reduced this most uncomfortable and often disabling condition.

Litters were in short supply in the later stages of the war. The losses from bases and from the theater were very high due to faulty property exchange.[5]

Distribution Within the Theater

As stocks gradually were built up in the theater, standard catalogs were distributed and replenishment issues of any item became available. Units were instructed to use maintenance factors and TBA's as a basis for requirements. Requisitioning was on a monthly basis. Depot stocks were balanced by intratheater movement of stocks at first, later by direct shipments from the United States to the designated port depots.

All control of depot stocks was centrally vested in the office of the Chief, Supply Division, Surgeon's Office, USASOS, where the central stock records were kept. Routine requisitions were cleared at base section level. Items in excess of TBA's or controlled items required the approval of the Chief, Supply Division.

This was a system based on standard supply practices of industry and the military. There was a minimum of wasted efforts, centralization was tight only where needed, and no undue obstacles were interposed between consumer and supplier.

During 1943, two ships had been converted in the theater for use as intratheater hospital ships. These ships, the *Tasman* and the *Maetsuycker* (fig. 113), were equipped and staffed with supplies and personnel available within the theater. Their mission was to make scheduled evacuation runs from the New Guinea ports to the Australian base ports. On their return trips, they would carry medical supplies and units or personnel from Australia. They were extremely useful because of their regular schedule. The cargo space was con-

[5] (1) Annual Report, Chief Surgeon, U.S. Army Services of Supply, Southwest Pacific Area, 1944. (2) Check Sheet, G–4, Headquarters, U.S. Army Services of Supply, to Chief Surgeon, 8 Mar. 1945, subject: Joint Supply Survey Board Report of Inspection. (3) Letter, Col. Charles M. Downs, MC, Surgeon, X Corps, to The Surgeon General, 12 Dec. 1944, subject: Shortage of Foot Powder.

FIGURE 113.—Hospital ship *Mactsuycker* was taken over from the Dutch and used as an intratheater hospital ship.

siderable—about 1,100 ship tons for both ships—enough for over 30 days' medical maintenance for 40,000 men. During the first 3 months of its operation, the *Tasman* alone carried 2,500 ship tons of medical supplies to New Guinea.[6]

Special Methods for Automatic Supply

Medical supply officers in advance bases on New Guinea, plagued by heat, humidity, lack of equipment, enemy nuisance raids, and impossible roads, had concluded that a system had to be devised that would more efficiently supply advanced bases. Paperwork needed to be reduced, trained personnel were needed desperately, and overages and shortages had to be eliminated (fig. 114).

Automatic shipment of supplies was not the answer. Shipment on a requisitioning basis would eliminate overages and shortages, but this would put a load on personnel in the forward bases by asking them to compute requirements.

An effective, yet simple, method of automatic supply to forward areas, based on actual consumption, was developed. Under this system, the requisitioning depot entered on the "Inventory Report" form the amount on hand,

[6] (1) See footnotes 4, p. 443; and 5 (1), p. 444. (2) Historical Report, 4th Quarter, 1943, Hospital Ship *Tasman* and 2d Portable Surgical Hospital.

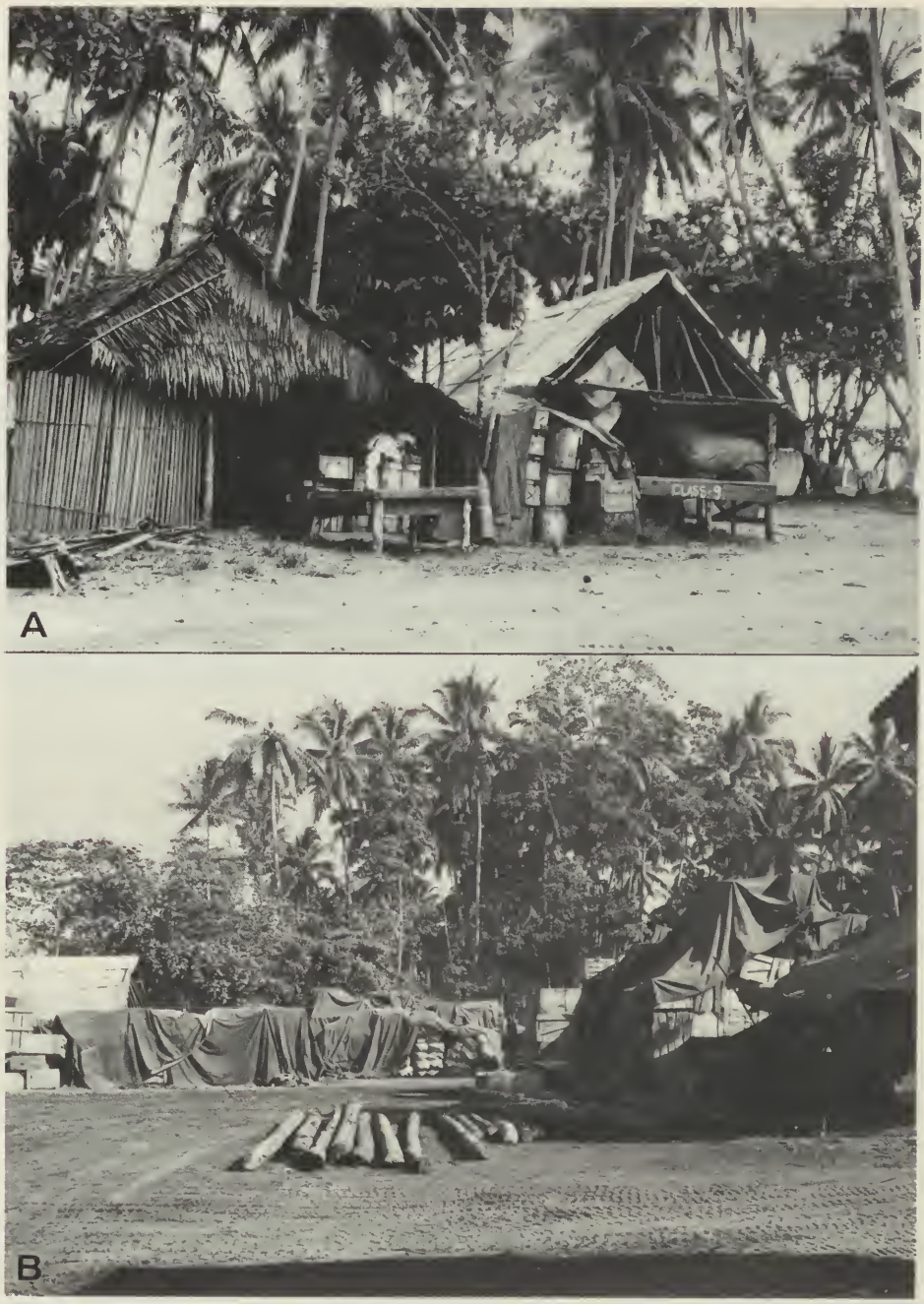

FIGURE 114.—A. Medical supplies at Oro Bay, New Guinea, deteriorated when stored in buildings having leaky roofs, dirt floors, and inadequate storage space. B. Uncovered medical supplies at a depot in Oro Bay, New Guinea, exposed to the elements, rotted for lack of protection.

and the issuing depot completed the form indicating supplies known to be en route but not received, authorized and estimated requirements, and action taken.

After the computation and completion of the report, it was forwarded to the appropriate depot for filing. The system worked well as it was simple, reduced paperwork and the need for trained personnel in the forward bases, furnished supplies at a rate approximating actual consumption, thus eliminating imbalances which occurred with a strictly automatic method, and provided a periodic stock status report from forward bases.[7]

Planning Operation DEXTERITY

At the same time that the Japanese were being driven from the Solomons, the Sixth U.S. Army was establishing its headquarters at Cape Sudest, New Guinea. Plans were made there for Operation DEXTERITY which involved attacks on Arawe on 15 December 1943, on Cape Gloucester, New Britain, on 26 December 1943, and on Saidor on 2 January 1944. DEXTERITY was the first operation under Sixth U.S. Army control.[8]

While initial medical supply for these operations consisted of those supplies carried in by the units involved, resupply for the Arawe operation came from the 15th Medical Supply Platoon (Aviation) and a platoon of the 9th Medical Supply Depot while, on 30 January 1944, the 21st Medical Supply Platoon (Aviation) landed at Cape Gloucester with two medical maintenance units, each designed to provide medical support to 5,000 troops for 30 days. This was the first time that a medical supply platoon (aviation) was used in operational support, and this action proved so successful that it became a frequent procedure in later operations.

Shortly after the task force arrived in the objective area, Headquarters, Alamo Force, received an urgent request from the Arawe surgeon for sufficient supplies and equipment to reestablish an operating room. The single operating room setup on Arawe had received a direct hit, virtually destroying all material. With the aid of medical officers, the essential items were ascertained and assembled, and within 18 hours after receipt of the message from the Arawe surgeon, the supplies and equipment had been delivered.

To accomplish this swift delivery, the material was airlifted from Cape Sudest to Finschhafen, moved to Dreger Harbor by jeep, with the final lap to the beachhead at Arawe by PT boat. Thus, the pattern was set. The many medical supply emergencies that were to follow would be met in a similar unorthodox fashion by close coordination of land, sea, and air transportation.

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[7] Quarterly Reports, Surgeon, U.S. Advanced Base, 1 Oct. 1942 to 31 Mar. 1943.

[8] (1) Quarterly Reports, Surgeon, Sixth U.S. Army, 20 Jan.–30 June 1943. (2) Quarterly Reports, Surgeon, Sixth U.S. Army, 1944. (3) Manuscript covering medical supply activities of the Sixth and Eighth U.S. Armies in the Southwest Pacific, prepared for a preliminary draft of this volume by Lt. Col. John M. Hunt, MSC, and Col. Albert E. Minns, Jr., MSC. (4) For further details, see footnote 1 (1), p. 432.

Meanwhile, the 27th Medical Supply Platoon (Aviation) had moved from Milne Bay to Cape Cretin where it staged for the Saidor operation, and then had moved to Saidor on 6 January where it operated a medical supply depot until 20 March.

Medical Supply for the Hollandia-Aitape Operation

Planning for the assault on Hollandia and Aitape accelerated in April 1944. The operation, which was spearheaded by two task forces, "Reckless" and "Persecution," began on 22 April with simultaneous assaults. The 163d Regimental Combat Team struck at Aitape, 125 miles southeast of Hollandia, while the 24th and 41st Infantry Divisions landed at Hollandia and marched immediately to the airfields near Lake Sentani. Each division carried 30 days' medical supplies and was backed up by the 21st Medical Supply Platoon which had staged at Oro Bay and Finschhafen since February (map 36).[9]

In addition to being the first full-scale operation in the Southwest Pacific Area, the Hollandia operation also provided the first real logistical nightmare despite the fact that enemy resistance at Hollandia was much less than anticipated. To provide dispersion, two beaches were selected, one on Tanahmerah Bay and one on Humboldt Bay. Although available maps indicated that both would provide suitable areas for dumps, Tanahmerah Bay soon presented many serious problems. Offshore coral reefs prevented the LST's (landing ships, tank) from discharging as planned. The area behind the beach, moreover, was swampy, and there was no connecting road between the beach and the main supply route which led to Lake Sentani and the airfields. As a consequence, an order was issued to divert those supplies destined for this beach to the Humboldt Bay area, which by this time was stacked with supplies of all technical services. To add to the confusion, a lone Japanese bomber, on the night of D+1, bombed a former Japanese ammunition dump on White Beach. The explosion started a fire at the gasoline dump which burned for 2 days, causing extensive damage and jeopardizing the surrounding area.

Fires on the beach resolved the problem of segregating the mixture of supplies, which in itself had caused shortages of some items very early in the operation. More seriously, however, with more troops arriving continually, the fire created a situation in all types of supply from which the base was several weeks in recovering. This was the first base at which 62- and 112-foot supply vessels were utilized by the supporting base surgeon, Lt. Col. (later Col.) Everett G. King, MC. They proved to be invaluable, being utilized in the delivery of medical supplies to forward bases, such as Hollandia, and in procuring items from rear bases as well as movement of patients to and from ships. Meanwhile, supply support at Hollandia was further complicated by heavy rains and landslides that made existing roads useless and entire areas impassable to troops carrying medical supplies on litters. To compensate for the han-

[9] (1) See footnotes 5(1), p. 444; and 8(2), p. 447. (2) Quarterly Reports, 32d Infantry Division, 2d, 3d, and 4th quarters, 1944.

Map 36.—Medical supply support for the New Guinea operations, 1944.

dicaps, approximately 50 tons of medical supplies and equipment were airlifted into the operational area. This, plus the supplies brought in by the reserve units, promoted a gradual buildup. By the latter part of June 1944, sufficient supplies were positioned to meet most demands.

The 127th Regimental Combat Team of the 32d Infantry Division, which arrived at Aitape on D+1, received its medical supplies through the chain of evacuation. The supplies forwarded overland were carried inland from the end of the ambulance trail by returning litter bearers or native carriers. Other medical supplies were airdropped with the rations, with a good percentage of recovery. On 1 August, when parachutes were supplied, the airdropping and recovery of litters and glass-contained medical supplies became perfect, the parachutes cutting the drop sufficiently to avoid all breaking, as well as furnishing a visible distinguishing marker. Critical items were foot powder and typhus vaccine.

Movement Toward the Philippines

In mid-May 1944, a reinforced regimental combat team, setting forth from Hollandia, captured Toem and nearby Wakde Island with supply support provided by the Hollandia Depot. At the end of May, the 41st Infantry Division embarked from Hollandia for an attack on Biak with medical supply support coming from a platoon of the 27th Medical Depot Company, and with resupply coming from the depot at Finschhafen being operated by the base platoon of the 29th Medical Depot Company, and from Hollandia where the Storage and Issue Platoon of the 29th had relieved the 21st Medical Supply Platoon which had begun staging for the Leyte operation (fig. 115).

By mid-September, Noemfoor Island, midway between Biak and the western end of New Guinea, bases on Vogelkop Peninsula which fell in late August, and Morotai which fell without major enemy resistance had been cleared of enemy forces, thus setting the stage for further operations in the Philippines (fig. 116).

SOUTHWEST PACIFIC AREA

Early Supply Activities of the Sixth U.S. Army in Australia

The Sixth U.S. Army, under command of Lt. Gen. (later Gen.) Walter Krueger, arrived at Camp Columbia, near Brisbane, on 17 April 1943. Intensive training for amphibious and jungle warfare followed, accompanied by a mounting incidence of malaria and a growing shortage of Atabrine.

From 17 April to June 1943, a Sixth U.S. Army medical supply subsection, which consisted of one warrant officer and two enlisted men, was engaged in planning for the support of the Kiriwina and Woodlark Islands operations (Alamo Force) which were to be mounted from Milne Bay. Concurrently with inspections and training activities, the first requisition for medical supplies was submitted to USASOS to support the operation. Shortly thereafter, the

FIGURE 115.—Local issue office of the 29th Medical Depot Company, Base F, Finschhafen, New Guinea.

plans were changed, as were most plans, to stage and mount the task force from Townsville, and it was necessary to submit another requisition for the troops in that area.

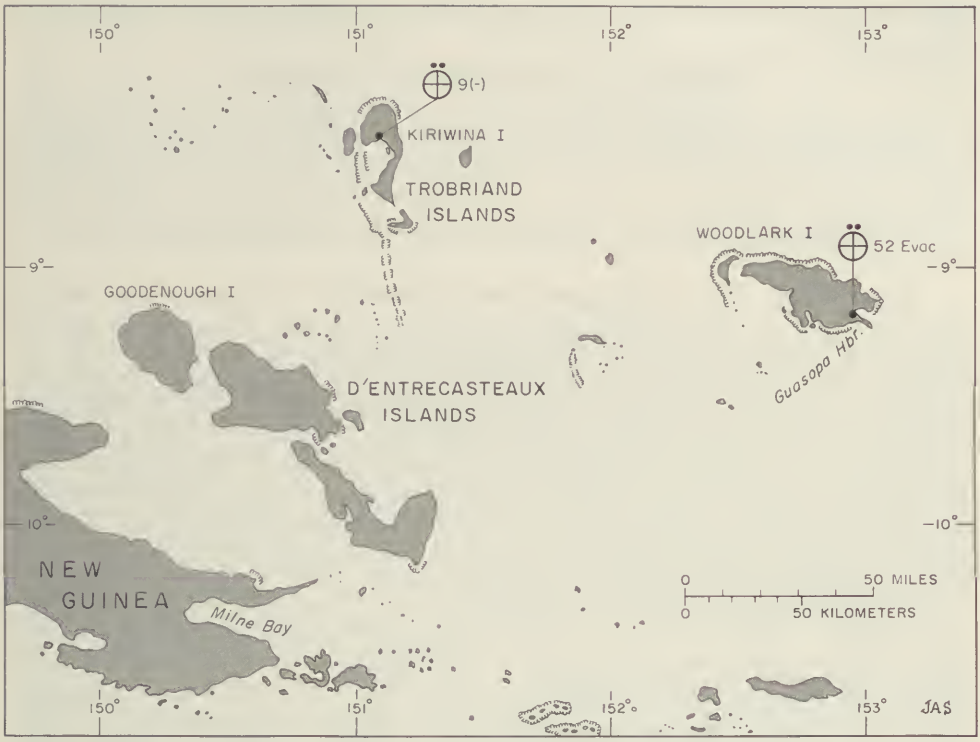
Combat Supply Lines Begin to Stretch

From June through early September 1943, combined Australian and American forces executed a plan that was to regain that area of New Guinea situated between Buna and Finschhafen. The U.S. Army Services of Supply provided logistical support to the Army and the Navy with 30 to 90 days of stocks placed at intermediate and advance bases. In addition to the support of the Alamo Force, which was first designed to conduct operations in Woodlark, Kiriwina, and New Britain under control of General Headquarters, SWPA, and separate from forces operating in New Guinea, the Sixth U.S. Army was also responsible for the support of the 503d Parachute Infantry Regiment which operated directly under General of the Army Douglas MacArthur.

FIGURE 116.—Conveyor system for bringing supplies ashore on Morotai Island, September 1944.

On 14 June 1943, the forward echelon of the Sixth U.S. Army, then operating as the Alamo Force, moved to Milne Bay, from which Operation CHRONICLE, involving the Kiriwina and Woodlark Islands, was launched on 30 June (map 37). Medical supply support for Kiriwina was assigned to a detachment of the 9th Medical Supply Depot while the medical supply officer of the 52d Evacuation Hospital was responsible for medical supply on Woodlark. Although both operations were unopposed, participating personnel figuratively and literally got their feet wet by way of introduction to the peculiarities and problems of actual amphibious landings and operations on the Pacific islands. Steady torrential rains made it difficult to locate, establish, and maintain operational supply points, or to preserve supplies and equipment. Also, receipt and control of shipments without the necessary documentation became more difficult as supply lines lengthened and transportation shortages were added to administrative delays. Unorthodox methods were the rule in overcoming medical supply deficiencies.

Logistical problems were constant companions as the Alamo Force went on to develop Milne and Oro Bays. During the early phases of these combat



MAP 37.—Medical supply support for Operation CHRONICLE.

operations, some delays in acquiring supplies were rooted in the administrative procedures. As an example, supplies requisitioned by the Sixth U.S. Army with a request that they be earmarked for Army use in a specific operation were receipted for and placed in base depots. Units, for which the supplies were intended, were required to submit formal requisitions through the base surgeon for editing and approval before supply action. In view of the usual urgency circumscribing each operation, this added step was frustrating to the medical units assigned to combat forces.

On 15 August 1943, Services of Supply assumed responsibility for the buildup of Milne and Oro Bays from the Alamo Force which moved to Goodenough Island. At about this same time, the Surgeon, Sixth U.S. Army, began augmenting both echelons of his supply staff as the first requisitioned medical units began to arrive from the Zone of Interior. Warrant Officer (later Lt.) Leslie C. Scott, MAC, who had been serving as medical supply officer from the date of Sixth U.S. Army activation, was provided an assistant, Lt. (later Capt.) Irwin Lee, MAC, who was assigned as the rear echelon liaison officer. This arrangement ended abruptly on 8 December 1943 when Lieutenant Scott succumbed to a heart attack, and Lieutenant Lee was quickly detailed to the Alamo Force as his replacement. A permanent replacement for Lieutenant Lee was not forthcoming until June when Lt. (later Maj.) John M. Hunt, Jr.,

MSC, was ordered in to assist the stepped-up planning for the invasion of the Philippines.[10]

Eighth U.S. Army Supply Activities

Headquarters, Eighth U.S. Army, was established at Lake Sentani in September 1944. Col. John F. Bohlender, MC, Surgeon of the Advance Party, Headquarters, Eighth U.S. Army, was succeeded by Col. (later Brig. Gen.) George W Rice, MC, who had been in the Pacific ever since the early days of the war.

Because the Eighth U.S. Army was scheduled to operate in the wake of the Sixth U.S. Army in a mopping-up role, Colonel Rice directed his medical supply officer, Maj. (later Lt. Col.) Albert E. Minns, Jr., MAC, to make immediate contact with the Sixth U.S. Army medical supply officers to gain the advantage of their experience, become acquainted with their modus operandi and the status of medical supplies, and to assure that a cooperative spirit prevailed from the beginning. The first meeting with the medical supply personnel of Sixth U.S. Army headquarters resulted in the establishment of the very finest of working relationships which was to last throughout the war.

The Medical Supply Division, Eighth U.S. Army, consisted of two officers, one warrant officer, and three enlisted men. Normal methods of obtaining supplies, when a unit was preparing for an operation, were usually sufficient, but there were always urgent appeals for items that had been lost in shipment, destroyed by enemy action, broken in normal usage, or forgotten in the preparation to move out. Movements of this kind were followed by immediate resupply action.

Colonel Rice, before being designated Surgeon, Eighth U.S. Army, was adviser on medical matters in the G–4 section of General Headquarters. He was thus familiar with the peculiarities and problems of logistics. He had seen at firsthand how fast action could reduce or, in some instances, eliminate suffering and, in general, was acquainted with the medical supply situation. He knew that emergencies would arise and expected his supply personnel to go to almost any extreme to deal with them. This was both medical supply policy and standing operating procedure for the Eighth U.S. Army.

In practice, when a radio request for medical supplies was received by the Medical Section, Eighth U.S. Army headquarters, one of the two officers or the warrant officer would be contacted regardless of the time of day or night. The procedure from that point was to go to the nearest medical depot, pick up the requested items immediately, tuck them under the arm of one of the supply personnel, who would hitchhike by air to the nearest airstrip, then solicit rides by vehicle or small craft to the final destination, and personally deliver the items requisitioned. The courier usually would have delivered the material within a few hours and returned to home base by the means used in making the delivery.

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[10] See footnote 8 (1), p. 447.

Trips to supply points were often dangerous. Sometimes, the planes were not able to land either because of enemy action or because of excessive mud. On some runs, due to the exigency of the need for the item being delivered, the pilot would make a pass over the unit and the items would be dropped in the unit's front yard. Official statistics do not show the tremendous amounts moved forward in that manner.[11]

CHANGES IN THEATER SUPPLY PROCEDURES

Distribution Functions

In early 1944, a major change took place in supply procedure in Services of Supply whereby all distribution functions of all services were lumped together into two operating field agencies known as Distribution Division, Headquarters, USASOS, at Sydney, under command of Lt. Col. John D. Blair, MC, and the Distribution Division, Branch A, at Milne Bay, with Capt. Leonard H. Kolb, MC, in command. In each of these, a medical section was assigned under the supervision of well-qualified medical supply officers. As for the medical supply division, this change was a crippling one, resulting in near disaster. The establishment of the new system definitely hindered and played havoc with the medical supply system.

The mission of the Distribution Division was to establish schedules to assure the movement of supplies and equipment from the United States and from Australia to New Guinea in accordance with requirements, effect distribution of supplies and equipment to maintain prescribed theater levels and balanced stocks for the theater as a whole, control receipts and shipments to assure proper distribution between Australia and New Guinea and between base sections in Australia, requisition on the United States or Director of Procurement for supplies and equipment to maintain prescribed theater levels, and prepare status of supply reports required by the Commanding General, USASOS.

Distribution Branch A had a mission to establish schedules to assure movements of supplies and equipment between bases forward of the Australian mainland in accordance with requirements; to effect distribution of supplies and equipment to maintain prescribed levels and balanced stocks in bases forward of the Australian mainland; and to forward requisitions for critical and controlled items to Headquarters, USASOS, and to the Director of Distribution, for all other supplies and equipment to maintain prescribed levels, provided such requisitions were not filled from bases forward of the Australian mainland. The concern for strict uniformity in all services resulted in "hitching racehorses to mules." One of the semiannual medical requisitions was delayed over 2 months lying around or being passed from one to another and then finally returned for complete retyping to furnish extra copies for each

[11] (1) Quarterly Reports, Eighth U.S. Army, June–December 1944. (2) See footnote 8(3), p. 447. (3) Minns, Albert E., Jr.: Medical Supply, United States Eighth Army: New Guinea to Japan. [Official record.]

division. This created very serious and almost disastrous shortages later in 1944.

In New Guinea, the situation was even worse. Distribution Branch A at Milne Bay was again merely another echelon, another obstacle in the headquarters maze. Requisitions from units bounced around from subbases, to bases, to Intersection headquarters, to Distribution Branch A, to the Australian mainland to the Distribution Division, and back again through the same tortuous cycle. It was a wonder the consumers ever got anything at all.

U.S. Army Services of Supply General Depot

In late 1944, still another agency was created on top of all the others, the USASOS General Depot, whose mission was to adjust maintenance factors, control theater stock levels, and prepare requisitions on the United States. All the technical services were represented in this agency. There were now two completely independent agencies involved in stock control in the theater, one for intratheater (Distribution Division) and one for control of theater levels and requisitioning from the United States (USASOS General Depot). It was intended that the latter would eventually become a true depot, responsible for the actual physical handling of supplies.

With the creation of these two agencies, the Chief of Medical Supply, USASOS, virtually ceased to have operating functions. All phases of stock control, including control over critical items, were now out of his hands. Even planning for future operations was done by one or the other of the two supply agencies.

The USASOS General Depot, an independent agency, did accomplish one useful purpose. A detailed study was initiated on maintenance factors. By the end of 1944, approximately 700 items had been studied and factors revised with very encouraging results later. Replacement factor studies were placed on a continuing basis to further modify the existing factors as applied to actual consumption in the Southwest Pacific Area.[12]

NEW GEORGIA CAMPAIGN

Planning the Assault

The initial medical supply plan for the New Georgia operation, scheduled to begin in June 1943, was a joint responsibility of the 43d Infantry Division and the Navy Task Force. The XIV Corps, on Guadalcanal, was charged with the responsibility for furnishing the necessary medical supplies for the operation, but had no part in the planning.

The original plan provided that complete TBA equipment would be on hand, plus such additional non-TBA equipment as was deemed necessary for the operation. Sixty days' medical maintenance supplies were to be available, 30 days' supply to be carried by units, with the remainder in division reserve

[12] See footnote 5(1), p. 444.

to be forwarded as soon as practicable. It was also planned that a 60-day level of medical maintenance supplies be maintained. Certain vital supplies, such as sulfonamide drugs, dried blood plasma, intravenous saline, glucose solutions, battle dressings, morphine Syrettes, and other items which were expected to be expended at an abnormally high rate, were to be supplied in amounts 10 times the normal maintenance allowances. Individual jungle kits were to be supplied on the basis of one per officer and medical department soldier and one per four nonmedics. Antimalarial drugs were to be supplied for 60 days and maintained at that level.

The Surgeon, XIV Corps, reported that duplication of requisitions resulted from an attempt to secure medical supplies in excess of anticipated needs. Supplies came not only from Guadalcanal, but some were also sent directly to the 43d Division from the rear. This procedure resulted in last minute confusion because of the all-out effort to fill all reasonable requests for supplies. Supplies were not issued according to actual needs, but on a basis of taking all that could be made available.

Problems of Supply Distribution

Because estimates of cubage and tonnage were made on the basis of days of supplies rather than actual stocks on hand, units arrived on the beaches with more impedimenta than could be accommodated on assigned water transportation. Many supplies were left on the beaches to follow at a later date. The bulk of critically needed items did not accompany troops on their initial move. Only a 10-day medical maintenance supply actually accompanied units instead of the usual 30-day, and these were hopelessly mixed with rations, fuel, and ammunition. Radiographic requests for additional medical supplies took almost 3 days to reach Guadalcanal. Emergency shipments had to be flown to New Georgia.

The division medical supply officer, left at the Russell Islands to service the garrison there and other small garrisons at Wickham, Viru, and Segi, finally came in on his own initiative, but brought with him none of the 75 tons of supplies stored on the Russells. These were finally sent on 5 August 1943. In the meantime, a 30-day medical maintenance allowance had been sent from Guadalcanal. Despite the obvious mishandling of supplies, medical service of the 43d Division was not impaired.

It was learned in this operation that a definite supply level must be established and maintained, but without any excess that might hamper movement. Containers must be properly marked to show quantity and nature of contents and critical items must be separated and left in the hands of medical department personnel. A medical supply dump had to be established under adequate supervision with a central location for reserve supplies. Sufficient personnel to handle supplies properly was also a necessity.[13]

[13] See footnote 1(3), p. 432.

Map 38.—Medical supply in the New Georgia campaign, 5 September 1943.

Medical Supply Support in the Field

The 17th Field Hospital, which arrived on New Georgia on 4 September 1943, after the island was secured, found that it was short of litters and biologicals and, upon request, received a medical maintenance unit with allowances for 5,000 men for 30 days from Guadalcanal. Until the medical depot was established by an advance section of the 23d Medical Depot on 8 September, the 17th Field Hospital served as the storage and distribution point for corps medical supplies (map 38). These supplies, consisting of biologicals, litters, antimalarial drugs, and various insecticides, were then transferred to the depot and, along with the 30 days' supply brought by the depot unit, provided the source of supplies for all Army units at the base. When the 37th Infantry Division moved to the rear, they were instructed by the Surgeon, XIV Corps, to turn in all surplus medical supplies and unserviceable equipment to the 23d

Medical Depot. This obviated the possibility that many supplies might be discarded and scattered. As the units moved out, approximately 30 tons of supplies, many critical items, were turned in.[14]

ALEUTIAN ISLANDS CAMPAIGN

While the Japanese offensive in the South and Southwest Pacific was being contained in New Guinea and the Solomons, the Japanese, who had moved into the Aleutians[15] in the summer and fall of 1942 and occupied Kiska and Attu, were posing a threat to the Alaskan mainland.

On 1 April 1943, a joint directive from Commander in Chief, Pacific, and Commanding General, Western Defense Command, ordered the elimination of the Japanese and the occupation of Attu. Directives were issued to organize a joint Army and Navy force, under overall Navy command. The nucleus of the Army component was to be the 7th Infantry Division.

Planning the Assault on Attu

Late in March 1943, Maj. (later Col.) Laurence A. Potter, MC, Commander, 7th Division Medical Battalion, was recalled from a training exercise aboard ship off San Diego, and returned to the home station of the division, Fort Ord, Calif. Upon arrival, he (in private session with the commanding general of the division) was informed that he was to become Surgeon, 7th Infantry Division; that the division would form an independent task force for the recapture of Attu from the Japanese; that he, the surgeon, would go immediately to Headquarters, Fourth U.S. Army, in San Francisco, to plan the medical support, and prepare and submit requisitions to assure that the flow of supplies and equipment to the docks would begin in less than 10 days; that he could take no one from the medical service of the division with him, nor could he discuss with any medical service person in the division the mission or any of its requirements. Neither the medical supply officer, Capt. (later Lt. Col.) Leland H. Barton, MAC, nor his assistant, Capt. Horace D. Worley, MAC, was to be informed in any way of the mission.

Colonel Potter, Surgeon, 7th Infantry Division, acting as his own medical supply officer, proceeded to Headquarters, Fourth U.S. Army, and was briefed further with other division staff officers similarly restricted. After the general briefing, he was briefed separately by the Surgeon, Fourth U.S. Army. With the able assistance of members of the Fourth U.S. Army surgeon's office and in particular of Lt. Col. Bernard N. Riordan, MAC, 175 separate requisitions were prepared and submitted to the San Francisco Medical Depot in 36

[14] (1) Annual Report, 17th Field Hospital, South Pacific Area, 1943. (2) See footnote 1(3). p. 432.

[15] This section on medical support in the Aleutian Islands Campaign and on support of the Alaskan Garrison is based on the following documents: (1) Annual Report, Medical Department Activities, 7th Infantry Division, 7 Jan. 1944. (2) McNeil, Gordon H.: History of the Medical Department in Alaska in World War II. [Official record.] (3) Annual Report, Surgeon, Alaska Defense Command, 1942. (4) Annual Reports, Surgeon, Alaska Department, 1943 and 1944. (5) Personal recollections of Lt. Col. Laurence A. Potter, MC, Surgeon, 7th Infantry Division.

hours. A separate requisition was prepared for each stage of unloading of each ship carrying Army troops and Army cargo. Each attack transport was combat loaded for sequential discharge of a fighting force and its supporting elements, composed of battalion landing teams.

The medical supplies for the 15,000-man task force were divided into two 3-month groups. One group of supplies was carried on two cargo ships, and the other group was carried on the personnel and cargo carriers to supply units as they landed and progressed inland. They were divided into three elements for progressive discharge, 15 days carried by the units going ashore, 15 days for early unloading, and 60 days for late discharge.

The two field hospitals that provided hospitalization for the task force were non-TOE outfits, each short on equipment because there had been no time to supply all needed items before departure. Plans for the proper disposition of supplies and equipment were not discussed in detail until the task force was aboard ship and underway.

Supply Support of the Attu Landings

On 4 May 1943, the invasion force left Cold Bay, landing at two widely separated points on Attu in a dense fog on 11 May after several days' delay because of bad weather. For the entire 21-day period required to secure the island, it was necessary to provide medical supplies separately for each of these two combat elements. The central supply base was with the headquarters section of the organic medical battalion, whose supply officer served both the battalion and the division. All medical supplies received during the 7th Division's 4-month stay on Attu were in the form of medical maintenance units (fig. 117).

Supply Operations on Attu

In the initial stages of the operation on Attu, all equipment and supplies had to be hand-carried inland (map 39). Chests and rucksacks were necessarily left behind, to be brought forward by returning litter bearers as resupply. Much of the equipment, of course, would have been useless in any event, as tents drew enemy fire.

Because of the rugged terrain of Attu, rising sharply out of gluey mud, medical supply of the infantry battalions was extremely difficult and hazardous. Eventually, bulldozers were able to peel tundra down to the volcanic gravel of the island and provide a trail over which heavy trailers and sleds could be pulled for the movement of supplies (fig. 118).

Scheduled medical maintenance units arrived soon after the initial assault and were used to support the 400-bed semipermanent hospital for the garrison and preparations being made for the Kiska operation.

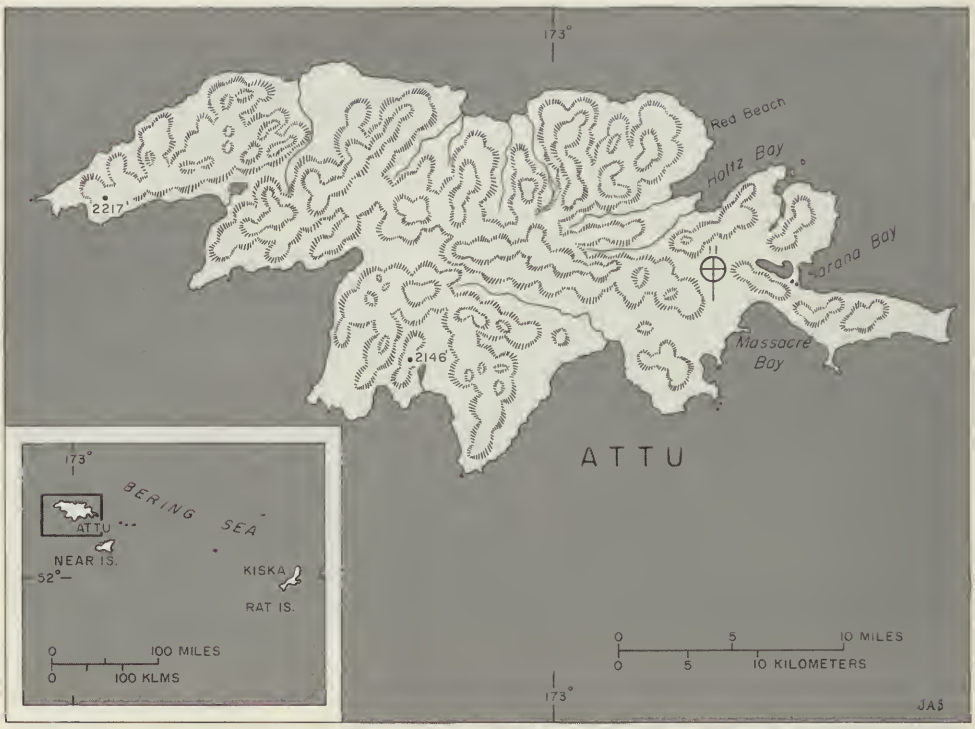
FIGURE 117.—Supplies piled on the beach at Attu, Aleutian Islands, 20 May 1943.

Medical Supply for the Kiska Assault

While the Attu operation was still in progress, planning began for the invasion of the neighboring island of Kiska. In late April 1943, units of the 7th Infantry Division which had not participated in the Attu operation were joined at Adak with the 13th Canadian Infantry Brigade, the 17th Infantry Regiment, and the 53d Infantry Regiment (Composite) of the Alaska Defense Command.

One of the important features of the training program, both at Fort Ord and later at Adak, was the emphasis given to the lessons learned at Attu. Reports and other material from Attu were made available, and the advice of those who had participated in that battle was eagerly sought.

To provide support for the battalion landing groups, the medical service force of 3,000 men was decentralized and divided to make each landing group medically self-sufficient and self-sustaining. Clearing stations and field hospitals were to be set up initially in the vicinity of the beach, and the initial 3-day supply for all but field hospital units was to be backpacked ashore in rucksacks and on packboards, with additional supplies and organizational equipment combat loaded for early debarkation. Individual medical kits were expanded, with each officer carrying two pouches, in one of which was a unit of dried plasma. A 30-day maintenance supply was combat loaded on each



Map 39.—Medical supply support in the Attu campaign, 4 May 1943.

transport ship, and, in addition, a 60-day maintenance supply was loaded on cargo vessels. A medical supply dump was to be established on each beach to handle these supplies (map 40).

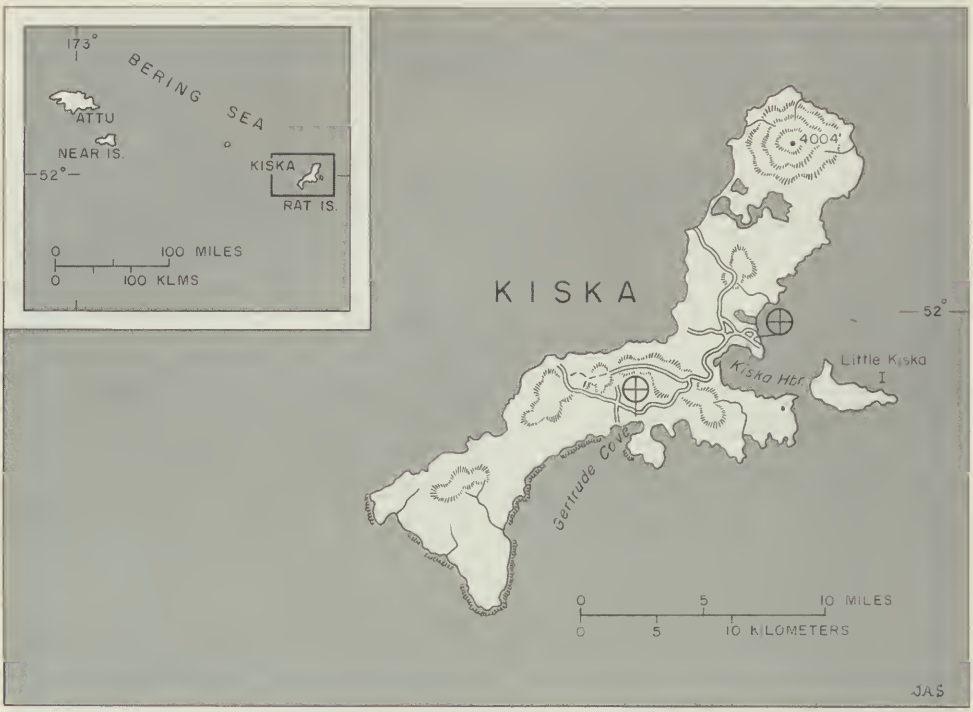
It was considered a possibility that isolated units which might not have the services of a medical officer would need emergency medical supplies. To meet such an eventuality, 58 medical parachute packs were prepared, packed in 5-gallon milk cans, and turned over to the Air Forces for delivery when necessary. Each pack contained morphine tartrate Syrettes, heat pads and refills, large and small first aid dressings, gauze bandage, muslin bandage, adhesive plaster, paregoric tablets, pentobarbital sodium capsules, sulfanilamide crystals, and a brief list of instructions.

Operational plans for the assault called for the unloading of all types of supplies for the various branches of the Air Forces as rapidly as possible, in view of the possibility that the ships might suddenly have to leave the island. Large dumps of supplies, indiscriminately mixed, soon piled up on the narrow, muddy beaches. Segregation of organizational equipment had been planned, but the system did not work. It became practically impossible to find much of the necessary equipment for the field hospitals, as all kinds of organizational supplies and equipment had been dumped on the beaches.

FIGURE 118.—Tractor bogged down in mud at Massacre Bay, Attu, 16 May 1943.

In one instance, it took 2 days to locate certain hospital equipment, which it was then possible to move by Caterpillar tractor only as far as an intervening creek. From that point, it had to be manhandled another 450 or 500 yards and finally hauled up a 50-foot embankment by rope.

The problems of gathering and properly caring for the widely dispersed medical supplies were numerous. A large number of medical maintenance units had been landed at North Beach, Gertrude Cove, and Kiska Harbor in addition to the other beaches. The almost complete lack of transportation had complicated the problem from the beginning, and tons of heavy equipment had to be moved by hand. The establishment of medical supply dumps in the main camp and in the Gertrude Cove area was handicapped by a shortage of lumber and cover, as well as a shortage of trained personnel (map 39). The organizational equipment of the field hospitals and of the Canadian and American medical units had to be retrieved and cared for by the Air Forces medical supply officer. Poorly marked and packed equipment added further complications, along with the large amount of pilfering which occurred. Further, the medical supply dump was moved four times on orders from higher authority before it was permanently located.



Map 40.—Medical supply on Kiska.

ALASKAN GARRISON, 1943–44

Problems of Supply Organization

The surgeon of the Alaskan theater, who was responsible for medical supply, was handicapped in his operation because he had to comply with the policies and procedures of three levels of command in addition to his own: the War Department, The Surgeon General, and the Overseas Supply Branch, Seattle Port of Embarkation.[16]

The necessity to function from one end of the territory of Attu, which is 3,201 air miles from Seattle by way of Fort Richardson, to Annette Island, 702 miles from Seattle, was also a distinct handicap. Despite the central location of Fort Richardson, the distance to the more remote posts was formidable.

This isolation of posts made it sometimes impossible to maintain the required quarterly and weekly reports on medical supply. An inventory of all medical supplies and equipment on hand as of 31 December 1942 was ordered by the theater surgeon in an effort to obtain an up-to-date and accu-

[16] See footnote 15, p. 459.

rate picture of the status of supplies in the command, and to provide the supply agencies in the United States with the required and pertinent information.

Supply Procedures

Initial requisitions for equipping a new station hospital were prepared and submitted by the Surgeon, Alaska Defense Command, or by a higher echelon of command which had assumed responsibility for the supply of the initial troop movement. In most instances, the Overseas Supply Branch, Seattle Port of Embarkation, acting on the recommendation of the Surgeon and available information concerning the strength of new stations and the plans for hospitalization, initiated the necessary requisitions for equipment and supplies, including medical maintenance units to provide a sufficient margin of maintenance for isolated Alaskan posts. Beginning in 1943, control over this initial planning passed into the hands of the theater surgeon, who assumed the responsibility for the medical equipment and supplies for the new stations established during that year.

In the early period, the function of the theater surgeon in the maintenance of adequate resupply was limited. By means of the medical maintenance unit, automatic shipment was made by the Seattle Port of Embarkation to each of the stations in Alaska from the summer of 1942 until November 1943. It was then discontinued on the recommendation of the theater surgeon because operating conditions made a requisition system more desirable and possible. The surgeon, however, had stated: "Without this Unit it remains doubtful whether medical supplies would have been on hand at the critical time."

Requisitions submitted for supplies in excess or not supplied by medical maintenance units received a preliminary editing in the surgeon's office and were then forwarded to the Seattle Port of Embarkation for further editing or submitted to The Surgeon General for a final decision. The theater surgeon in editing requisitions followed a policy of limiting special requisitions according to existing conditions.

Levels of Supply

On 4 August 1943, new supply levels were authorized. Group I (for easily accessible stations) was set at 30 days' operating, 60 days' reserve; group II (the majority of Alaskan stations), 30 days' operating, and 180 days' reserve; and group III (icebound), 270 days' operating and 180 days' reserve. Subsequent changes were made in these levels to reduce the prescribed figures as supply procedures became more regular. On 30 December 1944, the following levels for classes II and IV supplies were announced: Nome and Galena (icebound), 300 days; Shemya Island (inadequate harbor facilities), 210 days; and for all other stations, 105 days.

FIGURE 119.—Arctic first aid kit.

Experimenting With Medical Supplies

The Experimental Board, Alaskan Department, which had been established during 1941 to conduct tests during maneuvers, conducted experiments to determine the appropriate items to be contained in chests and kits needed by small detachments. These kits when developed were confirmed by their use in the 1944 maneuvers (fig. 119).

To determine the effects of freezing on common medical supplies, an extensive test was conducted in February 1943. Eighty-nine items, mostly Medical Catalog classes 1 and 9, were subjected to a temperature of −20°F., and then thawed and examined for any changes. Many of the items suffered no ill effects although frozen solid. For example, 50 units of blood plasma were subjected to freezing temperatures and the distilled water was frozen solid in the bottles. Only a very few bottles were cracked and, although the rubber stoppers were raised about ⅛ inch, no seals were broken. There was no precipitation or other obvious change in the appearance of the distilled

water. Another test with medical supply implications showed that the batteries for medical instruments froze and became useless when exposed to the extremely low temperatures.

The Deemphasis and Closing Down of the Alaskan Theater

After the elimination of the Japanese from the Aleutians, the War Department ordered a drastic reduction in the command from a peak strength of 147,000 in 1943 to approximately 50,000 by the end of 1944. Of the 34 posts activated during the period 1940–43, only 11 posts were large enough to have station hospitals. This introduced the problems peculiar to closing installations, packing and crating, and disposition of excesses in the wake of a reduced strength. At the outset, stations shipped surpluses directly to the Zone of Interior, but it was found more proficient to have the stations report their surpluses by radio to the surgeon at Fort Richardson. Thereafter, reports were screened for lateral distribution before the surgeon reported the items to the Zone of Interior as surplus.

BOUGAINVILLE CAMPAIGN

Planning the Campaign

While the Japanese were being driven from the Aleutians, thus removing the threat to the Alaskan mainland, American forces moved on Bougainville, the largest and most northerly island of the Solomons group. The invasion was launched on 1 November 1943 by the 3d Marine Division. A week later, the first elements of the 37th Infantry Division joined the battle, which became exclusively an Army affair when the Americal Division relieved the Marines in the latter part of December. Supply support for the 37th Division was carefully planned on the basis of that unit's own experience in the New Georgia campaign. Each element was supplied with 10 days' maintenance, including special items required by local conditions, so that each would be self-sustaining. Nondivisional units, although they requested many items of medical supply, received only those that did not interfere with the 37th Division supply needs.

Supply of Replacement Units

The Americal Division arrived on Bougainville in 1943 with a 90-day supply of medical items (fig. 120). A 30-day supply was carried by each infantry combat team, and a 30-day supply for the entire division was brought in with the division medical supply of the medical battalion (map 41).

Since it was generally difficult to obtain emergency medical supplies by air from Guadalcanal, certain items believed to be most valuable were added to the equipment of the clearing company. Most important were the autoclaves, anesthesia machines, aspirator, laryngoscopes, X-ray equipment, demountable fracture table, laboratory incubator, and refrigerator.

FIGURE 120.—Surgical team that arrived via SCAT plane on Bougainville is loading its equipment on a jeep for delivery to forward area of operation.

By February 1944, the medical maintenance unit method of supply had been replaced by the requisition from the service command.

Because of last minute loading, schedule changes resulted in leaving much equipment and medical supplies at the staging areas. When these supplies were most needed at the time of landing, they were not available. Base medical supply in the combat area was not set up for 2 or 3 months after the beginning of the operation.[17]

CENTRAL PACIFIC AREA

Early in 1943, following a period of rebuilding and expansion, the Hawaiian Department became a huge staging area for a number of infantry divisions which would later participate in numerous assaults on strategic Pacific islands. On 14 August 1943, the Hawaiian Department, previously expanded to include Midway, Christmas, and Canton Islands, was redesignated the Central Pacific Area.

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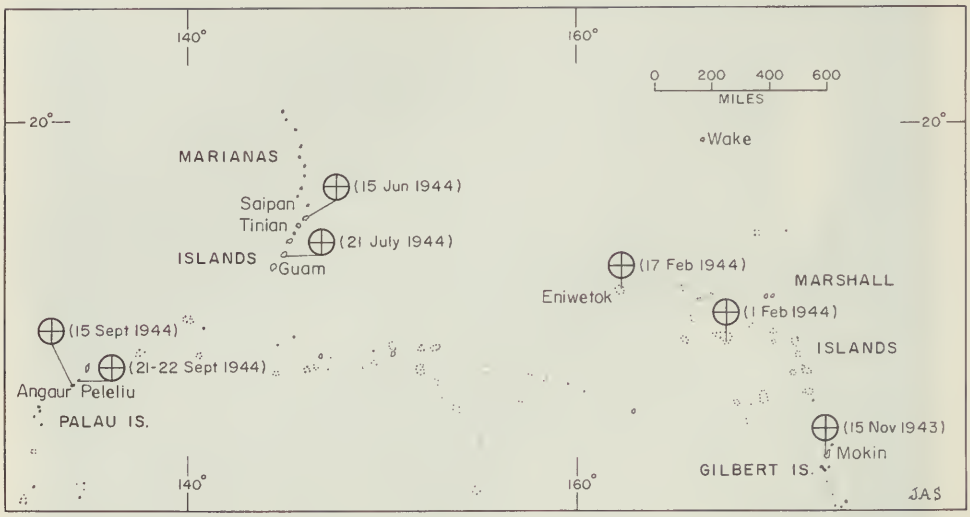
[17] See footnote 1(3), p. 432.

Map 41.—Medical supply support of the Bougainville campaign, 1943.

Supply Support of Operation GALVANIC

The Gilbert Islands, located approximately 2,400 miles west of the island of Oahu, were chosen as the target for the first assault launched in the mid-Pacific.

The 27th Infantry Division, in this joint Army, Navy, and Marine Corps operation, was given the objective of assaulting Makin Atoll on 15 November 1943. In this amphibious assault, the most essential medical supplies were removed from Medical Department chests, packed in canvas containers, and



Map 42.—Operations in the mid-Pacific, 1943–44.

carried on the backs of medical personnel. The battalion aid station operated for about 5 hours, using the supplies contained in these canvas bags before more supplies became available in quantity.

Supplies and equipment were also carried in jeeps equipped with litter frames, which had been priority loaded in the holds of the ships. Equipment sufficient for a 50-bed clearing station had been loaded for each clearing platoon. Extra instruments, cots, blankets, an electric portable suction apparatus powered by a small generator, and an 8-cu. ft. kerosene refrigerator, as well as supplies for 10 days based on a 20-percent casualty rate, made up the equipment.

This equipment was successfully unloaded on one of the assault beaches. It was followed by medical maintenance units, divided into 10-day and 20-day increments packed in special boxes not weighing over 100 pounds, so they could be easily handled. By D+4, supplies were collected and brought inland to a central dump at Hen Village. Resupply was in two sections, each a cross section of a medical maintenance unit. Three 10-day cross sections, one for each battalion landing team, were carried on the ships with the troops and turned over to the battalion supply officers upon landing. Two 15-day cross sections, loaded on two different ships, remained in division control upon landing (map 42).[18]

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[18] (1) See footnote 1(3), p. 432. (2) Annual Report, Surgeon, 27th Infantry Division, 1944. (3) Essential Technical Medical Data, United States Army Forces in the Central Pacific Area, for February 1944, dated 5 Mar. 1944. Inclosure 1, subject: Medical Service in Amphibious Operations.

Support of the Marshalls Campaign

After the successful invasion and capture of Makin and Tarawa in the Gilbert Islands, attention was focused in January 1944 on the Marshall Islands. Kwajalein, the largest of 80 islands and islets, was the target for a combined Army and Marine assault. The 7th Infantry Division, veteran of the Aleutian Islands Campaign, was assigned the responsibility of capturing the southern half of Kwajalein Atoll and also Majuro.

As they did in the assault on the Gilbert Islands (Operation GALVANIC), medical personnel carried most of the essential supplies on their backs. Among the successfully used carrying devices were rucksacks, waterproofed standard packboards, and BAR (battery acquisition radar) belts.

Medical sections were supplied varying amounts of plasma according to their projected needs. A total number of 1,156 units was carried by the task force. In addition, 1,000 morphine tartrate Syrettes were issued to medical personnel with each company aidman carrying 10 (map 42).

Platoons of the clearing company embarked separately, each with a battalion landing team. Each clearing platoon carried 20 litters, 2 blankets, 1 splint set, and 9 waterproofed boxes containing medical supplies, additional blankets, cots, and an electric portable suction machine. An electric refrigerator and other valuable pieces of equipment were carried by each clearing platoon to establish an effective surgical unit and, if necessary, a 200-bed hospital.

Medical maintenance for the assault forces consisted of an accompanying shipment of 30 days' supply divided into two lots, one for 10 days and one for 20 days, both loaded for the assault. These units came ashore in excellent condition because of the care taken in packing boxes and in using waterproof paper and pallets. The medical maintenance unit for the resupply of the assault forces consisted of an accompanying shipment of 30 days' supply which was divided into ten 10-day lots, each of which accompanied a battalion landing team and division artillery. The 20-day lot for medical detachments and hospital units was subdivided into two units of 10 days each for 7,500 men. All nonessential items were eliminated from these supplies, which were packed in 18- and 22- by 30-inch boxes and palletized.

Nine shore parties, assigned to the 7th Infantry Division to handle combat supplies, began functioning on the Kwajalein beaches on 1 February 1944, D+1. Resupply of aid stations was successfully accomplished by ambulances and litter bearers who brought up supplies on their return from the rear. Because of this system, medical maintenance units did not have to be used in the early stages of the operation.

The addition of blood transfusion equipment in the clearing company saved many lives. It was noted that advance medical units should carry L-splints in place of Thomas splints, one jet Coleman gas-burning stove, tarpaulins, and at least 18 litters and blankets. It was also recommended that more refined gauze compresses be used in lieu of the smaller Carlisle dressings.

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Waterproofing was found to be most essential in the preservation of supplies and equipment.

After the successful elimination of the Japanese from Kwajalein, field supplies left by tactical units were used for some time. An excess of supplies was experienced in the 31st Field Hospital and also in the 1st Station Hospital. Supplies were issued regularly every Tuesday except for emergency supplies which were issued as requested. To offset the deterioration of supplies caused by salt water spray, rain, and high winds, a program of lubrication and protection of surgical instruments was established. A medical supply subdepot was established at Provisional Station Hospital No. 2 with direct support coming from the 5th Medical Supply Depot in Hawaii.[19]

Medical Supply Activities on Eniwetok

The assault on Eniwetok, essentially a Marine operation, began on 17 February 1944 (map 42). Elements of the 106th Regimental Combat Team of the 27th Infantry Division supported the Marines and were instrumental in the capture of Eniwetok Island itself.

All medical units of the 106th Regimental Combat Team carried plasma, battle dressings, morphine Syrettes, and sulfanilamide powder. The provisional portable surgical hospital was equipped with instrument sets, a portable electric suction machine, a portable orthopedic table, operating lamps, a 1½-kilowatt electric power unit, and a complete set of blood transfusion apparatus. Its clearing company carried enough extra equipment to care for 400 patients.

The collecting platoons and battalion medical sections carried their essential supplies with them when they landed. Resupply of aid stations was through the regimental aid station using a battalion landing team medical maintenance unit, and by property exchange with the collecting platoons and the naval beach party in the early days of the operation, avoiding embarrassment which might have occurred because of delays in the landing of supplies.

Each battalion landing team carried a 7-day medical maintenance unit in the assault personnel carrier, and a 30-day unit, all boxed and palletized, was on the cargo vessel. As a result of this and previous operations, the medical maintenance unit was streamlined and a standard special list of equipment was developed by the Central Pacific Base Command consisting of items in excess of TOE's that would be needed to support a particular operation. These lists served to standardize authorizations for requisitioning materials and were subject to modifications as experience dictated.

Modification of the medical pouch by better waterproofing and enlarging was recommended after the Eniwetok campaign. The subsequent adoption of this modification made it unnecessary to carry the 3-day medical supply of plasma, sulfanilamide dressings, and morphine previously required.[20]

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[19] (1) See footnote 1(3), p. 432. (2) Report, Surgeon, 7th Infantry Division, to the Surgeon, United States Army in the Central Pacific Area, 27 Mar. 1944, subject: Medical Report, 7th Infantry Division, Reinforced, "Flintlock" Operations. (3) Annual Report, Army Garrison Forces, Kwajalein, 1944.

[20] See footnote 1(3), p. 432.

Medical Supplies for Operation FORAGER

The strategically placed Marianas Islands were selected as the next U.S. target in the mid-Pacific. An attack force consisting of the 2d and 4th Marine Divisions, backed up by the 27th Infantry Division, landed on Saipan Island on 15 June, covered by units of the U.S. Fifth Fleet. The intensity of the fighting brought the 27th into action earlier than anticipated.

Medical supplies for the assault either were carried in waterproofed bags on the backs of aid personnel, or were loaded on jeeps with litter frames. Supplies for the second echelon medical personnel were priority loaded on ¼-ton trucks, which were unloaded first, and 2½-ton trucks for the hospitalization units, or palletized in 2- by 2- by 3-foot boxes which had been loaded as broken stowage (fig. 121).

To facilitate handling, supply items were further divided into groups "A" and "B." The "A" group consisted of items needed initially by a battalion surgeon or a collecting station. This group, because it would be rapidly consumed, was given high priority in both loading and unloading. The "B" group consisted of items needed primarily by hospitalization units and would probably not be needed for at least 72 hours. This group required only normal unloading. Packing lists were given to each medical officer, and each box was numbered in the event that the pallets were unloaded on the wrong beaches.[21]

Special items to be used in Operation FORAGER were prepared by the Surgeon's Office, Central Pacific Area. Jungle kits for all Army assault forces and pack equipment for medical assault elements were approved for use.

All units carried a 10-day medical supply, and the field hospital carried an additional 20 days' maintenance. Supplies for the 27th Infantry Division were so packed that 10 days' supply would land with the assault forces and 20 days' supply would be delivered later to service echelons of the divisions for issue to units in the field. Each first and second echelon medical unit carried organically a 1-day reserve of certain rapidly expendable items, such as plasma, morphine Syrettes, and first aid dressings. The clearing company carried a 3-day reserve so that resupply would not be necessary immediately when the division would be operating from dumps along the shore.

Equipment other than the initial combat equipment, which generally proved to be adequate, was landed between 48 and 72 hours after the hospitalization platoons. Combat-loaded 2½-ton and ¼-ton trucks, landed a few hours after the combat troops, in some instances lost 5 to 10 percent of the major items of equipment either in transit or on the beaches. The late landing and slow procurement of organizational equipment and supplies created a heavy initial demand on division maintenance supplies and so depleted the stock of certain items that they had to be drawn from the garrison forces.

Resupply to the Marianas was placed in action by 20 June and was accomplished by automatic block shipments consisting of 3,000-men, 30-day

[21] See footnote 1(3), p. 432.

FIGURE 121.—Medical supply dump on Saipan.

maintenance units, modified from time to time according to the requests of the island surgeon for Saipan. Emergency resupply was on air shipment by emergency requisition.

Medical resupply in first and second echelon units was effected by request through channels from battalion aid stations to the collecting stations, to the clearing stations, to the division medical supply dump, or, in some instances, to the field hospitals. The supplies were then brought forward by ambulances returning from the rear. Because the activities of the regimental aid stations were limited, they were able to replenish supplies of battalion aid stations. The portable surgical hospitals were resupplied by the organization to which they were attached.

Only once when property exchange between the hospitals ashore and the hospital ships faltered did this method of resupply break down. Litters and blankets often remained too long with the dead at the cemetery, and when a heavy volume of casualties drained the supply of litters and blankets, these became the most critical items of supply. Patients had to be evacuated in makeshift litters. The shortage was corrected several days later when the volume of casualties decreased and the litters from cemeteries were reissued.

Shortages of intravenous sets, whole blood, X-ray machines, generators,

and washing machines were notable. Salt water and high humidity rendered generators and X-ray machines useless.

The organizational equipment of a 400-bed field hospital was not sufficient when it had to be expanded to 900 beds. On the other hand, the clearing company found itself overburdened with supplies and understaffed with personnel in many instances. Because of this situation, most of its equipment and supplies had to be left at a beach dump.

The medical supply officer of the Army Garrison Force, Saipan, arrived on D+10 and set forth with his medical supply sergeant, who had arrived earlier, to comb the beaches for scattered supplies. By 27 June, supplies had been accumulated at the temporary dump and were issued to troops.

To alleviate the shortage of personnel, eight men from various detachments were assigned to the Army Garrison Force Depot. Troops of a medical sanitary company were used as stevedores.

Early in July, the supply dump was moved to its permanent location at Magicienne Bay where supplies were stacked on dunnage and covered by a tarpaulin. Some time later, a frame building was constructed for use as a narcotic vault.

Supply activities of the Army Garrison Force Depot included the salvaging and issue to civilians of captured Japanese medical supplies, the rehabilitation of the 27th Division before departure from Saipan, aiding the 77th Division before departure from Guam, and processing requisitions from Guam, Tinian, and later Angaur, Peleliu Island, and Ulithi.

After Saipan, the next target was Guam, where the assault units, the 3d Marine Division and the 1st Provisional Marine Brigade, were supported by the 77th Infantry Division. In the Guam landings, quantities of medical equipment and supplies, including a large number of cots, were lost. As a result, the sick and wounded had to be placed on the ground. Much equipment was water-soaked and broken in the initial assault which occurred on 21 July 1944, less than 1 week after Saipan. Because of the barrier reef and deep water, difficulty in landing and unloading supplies was experienced. Despite initial problems, the type and amount of medical supplies on hand for the operation was adequate.

The capture of Tinian, the sister island of Saipan, was the third phase of Operation FORAGER. The Northern Attack Force, composed of the 2d and 4th Marine Divisions and elements of the 27th Infantry Division, launched the attack on 24 July.

As Tinian was close to Saipan, casualties were shipped directly to Saipan with LST's serving as hospital ships. Approximately 2,400 beds were made available on Saipan for the Tinian campaign. The only Army units that actually landed on Tinian were one battery from the 106th Field Artillery Battalion of the 27th Division Artillery and an engineer battalion. Because of the limited Army participation in the Tinian campaign, no drastic supply problems were encountered.

Support for the Palau Campaign

Capture of the Palau Island Group by American forces was essential to provide a Western Pacific airstrip for operations against the retreating Japanese. Again, as in previous operations, supplies were priority loaded with the basic load, a 3-day medical supply, being carried in by medical personnel or loaded on jeeps. A floating reserve consisted of a 10-day medical supply per each battalion landing team and a 20-day supply loaded aboard ship as broken stowage.

During the assault on Angaur Island by the 81st Infantry Division on 17 September, the "weasel" proved impractical as it threw its tracks on the rough terrain. Jeeps were used successfully in movement of patients and supplies. The beachmaster directed the unloading of the palletized supplies, which were brought ashore in LVT's (tracked landing vehicles), DUKW's (amphibious trucks, 2½-ton cargo), and other landing vehicles. Supplies were unloaded by hand until cranes were brought ashore sometime later (fig. 122). Medical battalion personnel collected all medical supplies in a central area and moved them as rapidly as possible to a medical supply dump. Many containers were discovered broken open and certain items, such as cots, litters, and alcohol, were pilfered. A satisfactory property exchange with the naval beach section made needed dressings, plasma, blankets, and litters available.

Division medical resupply was established on a 30-day basis, palletized, and located according to size of unit and the length of time the supplies were to last. One pallet weighing a ton supplied 2,000 men for 10 days. Two additional pallets of this size were set up for division special troops and reserve. A 20-day resupply for 7,500 men was set up on four pallets. An extra six pallets of medical supplies and one pallet of food were carried by each clearing platoon. Resupply of litters and blankets worked satisfactorily as did the resupply all down the line.

In this operation, it was evident that there was a need for an additional 2½-ton, 6×6 truck with a 1-ton trailer, one ¾-ton truck with water trailer, and one ¼-ton truck. There also was evidence that salt tablets needed to be kept dry in a waterproof container.

In the Peleliu operation, the 321st Regimental Combat Team took only a small amount of supplies with them on the initial assault. Difficulty in unloading cargo from the ships forced the unit to borrow supplies from the Marines. Absence of proper laundering and sterilizing equipment handicapped operation in the clearing station until a field sterilizer was sent from the 17th Field Hospital.

Owing to the absence of enemy troops on Ulithi Atoll, which was seized on 21–22 September, no problems of medical supply were encountered.[22]

[22] See footnote 1 (3), p. 432.

FIGURE 122.—Docks at Red Beach, Angaur, showing unloading of supplies, September 1944.

Improvements in Medical Supply

As a result of the experience gained in combat operations during 1944, waterproofing and packaging techniques improved, timely computations of the total TOE requirements were more thoroughly checked against depot stocks, and shortages were submitted as a bill of materials to the War Department for approval. The dispatching of separate requisitions which reflected the date, place, and time that the approved items would be needed expedited delivery of the materials to the using units before their deployment. Recognizing that the standard medical maintenance unit was not exactly suited for garrison needs, the Central Pacific Base Command in October 1944 compiled a modified equipment list, "Annex H Medical Maintenance Unit, Ten Thousand Men, 30 days," which was submitted to the San Francisco Port of Embarkation for subsequent delivery to advance bases as determined by the command. In addition, a medical maintenance unit was developed by the command to fill the demand for a streamlined block of medical supplies to accompany small groups of personnel moving to forward bases. By utilizing these new medical mainte-

nance units, medical supplies were dispersed more nearly on a per capita basis.[23]

Transition to Requisitioning in the Mid-Pacific

Experience resulting from the Marianas and the Palau operations in mid-1944 revealed that garrison forces were incapable of predicting and preparing the necessary requisitions for supply requirements immediately subsequent to the termination of automatic supply. This stemmed from the fact that resupply requirements had to be initiated at such an early date after the islands had been secured that the stock records in force were not accurate for requisitioning purposes, nor was the medical supply staff often sufficiently informed of current conditions to enable it to compile requisitions at such an early date. To circumvent this condition, a plan was exercised whereby the supply section of the Surgeon's Office, Central Pacific Base Command, in consultation with the task force surgeon, prepared initial requisitions and a phasing schedule before the departure of the garrison force. The items and quantities were based upon past consumption tables prepared in the medical supply section of the Central Pacific Base Command as well as the considerations of the task force surgeon.[24]

VOORHEES MISSION TO THE PACIFIC

Organization of the Survey Team

In the fall of 1944, a survey team headed by Col. Tracy S. Voorhees, JAGD, was sent by the Surgeon General's Office to the Pacific to make a survey of medical supply similar to the one performed in the European theater during February 1944.[25]

Colonel Voorhees was accompanied by Mr. Charles W. Harris, Deputy Chief of Supply for Storage, Surgeon General's Office, Lt. Col. Louis F. Williams, MSC, and Maj. Gordon S. Kjolsrud, MAC, of the Medical Branch, Overseas Supply Division of the San Francisco Port of Embarkation.

Survey of the Supply Situation in Hawaii

Arriving in Hawaii in early October 1944, the Voorhees team inspected depots on the islands of Hawaii, Kauai, and Maui and concluded, because of the excellent steamer service from Oahu, the site of the 5th Medical Supply Depot, that depots and warehouses were not needed on those outer islands. Great excesses and much old stock were stored in these depots following the old principle of dispersion invoked after Pearl Harbor.

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[23] (1) See footnote 1(3), p. 432. (2) Manuscript, covering medical supply in the Hawaiian Department, the Central Pacific, and Pacific Ocean Areas, prepared for a preliminary draft of this volume by Maj. Gen. Paul H. Streit, USA (Ret.), and Lt. Col. Allan W. Phelps, MSC.

[24] See footnote 23(2), above.

[25] This section is based on Voorhees, Tracy S.: Story of Pacific Trip, Oct.-Dec. 1944. In Colonel Voorhees' personal file.

To consolidate stocks in the Hawaiian Depot, the Voorhees team recommended that branch depots on the islands of Hawaii, Kauai, and Maui be closed and all supplies for the hospitals be requisitioned from the main depot on Oahu.

Two hundred people were engaged in preparing medical supplies for expeditions and assembling medical maintenance units which could be done on the mainland. By closing down this activity, it was hoped that some of these people could be used on Saipan, where there was a serious shortage of trained supply personnel.

The consolidation of the office of the medical supply officer of the Central Pacific Base Command surgeon with the depot was recommended as it would save much time and personnel involved in preparing the monthly stock report which would be unnecessary. It was suggested that one officer be made medical supply officer and commander of the 5th Medical Depot Company.

Supply Problems of the South Pacific

Upon arrival at New Caledonia on 25 October, a survey team discovered a great excess of medical supplies stored in two depots that were manned by an entire medical depot company. Although some excesses had been reported to the War Department, the depot was using the Surgeon General's Office consumption rates and had failed to develop any of their own.

It appeared that no one from command headquarters had inspected the depots on Guadalcanal and Espíritu Santo in the past 4 to 6 months and that excesses similar to those in New Caledonia also existed there.

As a result of the Voorhees survey, it was recommended that surpluses discovered in the inventory of stocks be reported to the Surgeon General's Office and nonusable stocks be shipped to the United States. This would reduce the depot workload.

Survey of New Guinea and the Philippines

In the survey of New Guinea which commenced on 7 November with the landing at Nadzab, New Guinea, the team found that the harbor at Hollandia was crowded with ships, many of which were waiting to be unloaded. Delays in requisitioning, caused by red tape, had created a serious shortage of certain items. All requisitions from the United States were processed through the Distribution Division, then located at Oro Bay, near Buna.

Shortages which existed at the depot at Hollandia were caused by the fact that the depot was not allowed to requisition directly. The requisitions had to clear through the Distribution Division and G–4 at Brisbane before reaching the depot at San Francisco. The basic weakness spotted in the supply system of the Southwest Pacific Area was that requisitioning was still being conducted on a theaterwide basis although depots were spread over 2,500 miles. No dependable transportation existed between bases, thus handicapping the transfer of supplies. While the three members of the survey team went on to Saipan,

Colonel Voorhees went to Leyte where the supply situation was "worse than critical" because of poor planning, excessive red tape in the requisitioning process, and the absence of suitable sites for depots and hospitals.

Because of the discrepancies found in consumption rates in the Southwest Pacific Area and the South Pacific Base Command, it appeared of prime importance that the Pacific theaters develop their own specific rates after careful study of actual rates for the more active items based upon issue experience for 1944. This was expected to result in great dividends in conservation of warehousing space, man-hours, and stocks.

Medical Supply Problems on Saipan

The supply team discovered that, because of failure to order supplemental items not in the medical maintenance unit in advance, stocks of certain items were seriously low on Saipan.

It was also noted that only one medical supply team of 2 officers and 20 men was handling the supply situation. At least one medical depot company was needed. The available personnel, although doing an exceptional job, lacked training in requisitioning.

To relieve this personnel problem on Saipan, it was recommended that a medical depot company be sent there to speed up supply functions and implement the necessary consolidation of supplies.

Recommendations for Improved Supply Operations

To avoid the shortage of supplies such as the one which occurred on Saipan, the Voorhees mission recommended that the necessary items not included in the medical maintenance units always be requisitioned well in advance of D-day of any operation. The approving office was encouraged to return a copy of the approved requisition to the ordering unit so that they might know what to expect before it arrived. The practice of back ordering was to be dropped to avoid duplicate requisitions and the keeping of a large number of unnecessary records.

It was further recommended that no island depot separate from the base depot was necessary. Consolidation of depots such as recommended for Hawaii and the South Pacific Area would save space as well as personnel and also would eliminate the intermediary step in distribution of supplies.

The survey team reported that the chief of the Supply Service, Central Pacific Base Command, should have clear-cut supervisory responsibility over medical depot operations, and the depot commander should report directly to him rather than to the surgeon.

To help with stock control and storage methods, it was recommended that an experienced depot officer be brought to the theater for 60 days.

Major Changes

Close scrutiny of the total Voorhees mission report reveals fundamentally that the absence of a closely knit medical supply organization had magnified some of the problems. The 3,700 miles that separated Hawaii, the supply base, from the Marianas did not permit a close-knit supply system.

Picking up the concern of many and the necessity for change, the Voorhees mission attempted to unscramble the situation and make a more proficient operation possible. Virtually all of the mission's recommendations were accepted and inaugurated, although gradually, as in the development of better storage facilities on Saipan and the arrival of additional supply personnel.

To offset the lack of a medical supply officer in the Pacific Ocean Areas, Maj. (later Lt. Col.) Donald E. Remund, MAC, an expert on warehousing, was assigned to the Surgeon's Office, Pacific Ocean Areas, as medical supply officer, but his influences on supply operations were less than expected. Because his responsibilities were not fully defined, his dealings with base commands were largely informal.

With the replacement of Brig. Gen. Edgar King by Brig. Gen. John M. Willis, as Surgeon, Headquarters, Pacific Ocean Areas, it appeared that the responsibility of the medical supply officer would increase. General Willis requested that Colonel Williams, a member of the Voorhees mission, be assigned as medical supply officer.

CHAPTER XIV

The Philippine Islands Campaign

PLANNING AND OPERATION OF THE LEYTE CAMPAIGN

In October 1944, 2½ years after the loss of Leyte to the Japanese, U.S. troops landed on that island in the first engagement of the Philippine Islands Campaign. Leyte, which constituted the geographic center of the Philippines, was of strategic importance as an airbase and support center for operations in the Luzon-Formosa-China coast area.

In planning medical supply support for the operation, past experience in the Pacific was reviewed, and steps were taken to minimize such common weaknesses as pilferage and breakage, the breakdown of property exchange under conditions of air evacuation, and the loss of supplies and equipment because of excessive humidity.

Built around the X and XXIV Corps, the assault on Leyte was to be the largest amphibious operation of the Pacific war to date (fig. 123). The Surgeon, Sixth U.S. Army, directed that a typical field army type medical service would be used to serve all combat and service troops. Fixed medical support would be furnished by the Army Service Command which would stay in Leyte and be responsible for the buildup of bases for future operations.[1]

Medical Supply Planning

All units supporting the landings were advised to bring 30 days' medical supplies to the objective area, and the assault troops would carry a 5-day supply. All service units carried a 30-day supply at debarkation.

Resupply plans called for nine assault medical maintenance units, each consisting of 10 days' supply for 10,000 troops, to arrive from A (Assault Day) +15 to A+30. In addition to these, and scheduled to arrive at the same time, were 1,000 litters; 2,000 blankets; 10 million Atabrine (quinacrine hydrochloride) tablets; and 100 cylinders of oxygen. From A-day to A+30, 10 preloaded ships from the San Francisco Port of Embarkation were to arrive with 30 days' medical supplies for 20,000 troops on board. Twelve additional preloaded ships were scheduled to arrive from A+30 to A+60.

One hundred tons of selected nonexpendable medical supplies were to be phased into predetermined points after A+40. Thirteen preloaded ships con-

[1] For a more detailed description of the Leyte operation, see: (1) Cannon, M. Hamlin: Leyte: The Return to the Philippines. United States Army in World War II. U.S. Government Printing Office, 1954. (2) Daboll, Warren W.: The Medical Department: Medical Service in the Asiatic Theater. United States Army in World War II. The Technical Services. [In preparation.]

FIGURE 123.—LST headed for the invasion of Leyte, Philippine Islands, 20 October 1944.

taining 30 days' supply for 60,000 troops were due to arrive from the Central Pacific Area during the period A-day to A+60.[2]

Medical Supply Support for the XXIV Corps

The XXIV Corps, which had trained in Hawaii in preparation for an assault on Yap Island, left Hawaii on 15 September 1944. When the ultimate destination of the convoy was changed to the Philippines, it became necessary to acquire large quantities of Atabrine, which were issued to troops on board ship. Support of the XXIV Corps was to come from the Central Pacific Area in a unique situation in which the corps was loaned to the Southwest Pacific Area.

Equipment for the corps was palletized to permit easy handling and loading into small craft and sledding on the runners to the initial location. The pallets were waterproofed to facilitate unloading through the surf. Planning and loading of medical supplies was under the supervision of the corps medical supply officer.

The first section of 10 days' supply landed on 10 pallets, each weighing 1,840 pounds, and was carried in by a battalion landing team and the division headquarters ship. The second section, 20 days' supply, was carried in three sections on three attack cargo ships.

In all the XXIV Corps Supply Detachment was divided to increase dispersion and to provide for an easy transition when the corps assumed control of the division dumps on the 6th day. Once established ashore, the small supply team supported a corps, which at times consisted of five divisions, and an unanticipated large-scale civilian medical care program during 5 months of combat. Under the direction of Lt. Clifford C. Long, MAC, and Lt. Harold A. Bates, MAC, a small field army type depot at Dulag, Leyte, and a port medical receiving yard for initial receipt of supplies unloaded over the beach were operated by the 2d Medical Supply Team.

Supply Problems of the XXIV Corps

Because of the large number of civilian casualties from aerial and naval bombardment, more surgical supplies and tetanus antitoxin were needed. Naval vessels, particularly hospital ships, became a ready source of scarce items, even whole field hospital assemblies. The occurrence of rabies and diphtheria required emergency delivery of special drugs.

During a time of "supply plenty," scheduled shipments were generally adequate except for a shortage of calamine lotion.

To support the 11th Airborne Division, which was for a time isolated in the middle of the island, a portable surgical hospital was airdropped. Later, a small airstrip was built which aided in supply.

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[2] (1) Operational History, Surgeon's Office, Headquarters, Sixth U.S. Army, 1944 (Leyte Campaign). [Official record.] (2) Quarterly Report, Surgeon, Sixth U.S. Army, Southwest Pacific Area, 1 Oct.–31 Dec. 1944.

Resupply of the XXIV Corps was in the form of medical maintenance units sent from west coast ports, supplemented by supplies from the South Pacific Area where a surplus existed. One ship from the South Pacific Area had 10,000 packages of medical material ranging from combat bandages to operating tables, suitable only for permanent or semipermanent installations. Many items, such as whirlpool baths, refrigerators, and Balkan frames, which were considered surplus to combat operations were turned over to the 34th Medical Depot Company which had arrived on 15 December 1944.

Because of the scarcity of firm ground on which to stack supplies and a general lack of dunnage, the bottom tier of supplies often sank out of sight in the deep mud. Despite every effort to recover, clean, and ship these damaged supplies, many of them were lost.

Refrigeration for blood and other medical items, such as penicillin, was scarce. Gas refrigerators had to be replaced with electric refrigerators because the concussion of nearby artillery blew out the gas flame. Since small refrigerators proved to be inadequate, each division medical supply was equipped with one walk-in model, moved on a 2½-ton truck. To offset the lack of power, 5- and 15-kilowatt generators were brought in from the South Pacific Area to meet the needs of various hospitals and clearing stations.

Shortages of such items as Merthiolate, foot powder, paregoric, bismuth, sulfaguanadine, cathartics, and laxatives as well as iodine, Fraser's Solution, and bandages occurred early in the fighting because many of these items were partially expended on ship even before landing due to the long period afloat. The inability of the Southwest Pacific Area depots to supply these drugs made it necessary to have them airshipped from the Pacific Ocean Areas. The combat medical maintenance units designed for smaller operations lacked some necessary items and had insufficient amounts of others.

With the progress of combat operations across Leyte, the XXIV Corps medical supply dump was moved in mid-December to Ormoc, where it was in direct support of action and later supported two divisions operating on the west coast. A section of the 34th Medical Depot Company had relieved the 2d Medical Supply Team to give better support for west coast operations.[3]

SUPPLY OPERATIONS WITH X CORPS ON LEYTE

Initial Landings

The X Corps, composed of the 1st Cavalry and the 24th Infantry Divisions, landed on Leyte with 30 days' medical supplies. Resupply was to be handled by the 21st Medical Supply Platoon (Aviation). Because of light enemy opposition, unloading of supplies was uninterrupted.

By 22 October, however, enemy aircraft had damaged the Liberty ship *Thomas*, anchored off White Beach and, as a result, medical supplies in its

[3](1) Quarterly Report, Surgeon, XXIV Corps, 1 Oct.–31 Dec. 1944. (2) See footnote 2, p. 485. (3) Medical Report, King 11 Operation, Appendix "C" to G–4 Report, Headquarters, 7th Infantry Division, 26 Dec. 1944–10 Feb. 1945. (4) Annual Report, 34th Medical Depot Company, 1944.

FIGURE 124.—Discharging supplies at the docks at Tacloban, Leyte Island, 1 November 1944.

hold were never unloaded. The *Alden*, another Liberty ship containing emergency medical supplies, reached the area on 24 October, but was not unloaded until approximately 5 November. Supplies from the *Alden* even then proved to be valuable in those critical days.

The 21st Medical Supply Platoon (Aviation) moved up to Tacloban (fig. 124), where it set up its depot and operated until relieved on 1 December by an advance section of the 34th Medical Depot Company (map 43).[4]

Early Supply Problems of X Corps Units

During the latter part of October, the flow of supplies and equipment into Leyte was interrupted by increased Japanese naval activity which reached its peak at the Battle of Leyte Gulf. Transportation was handicapped by the distance from resupply bases, continuous enemy air attacks, and the occurrence of three typhoons, which, with accompanying heavy rainfall, turned the area into a quagmire.

[4] Quarterly Report, X Corps, October-December 1944.

Map 43.—Medical supply depots on Leyte, 1944–45.

The heavy rains also delayed construction of warehouses and, by making roads impassable, hindered supply support to frontline troops who were being pressed to defeat the recently reinforced Japanese forces. To add to the existing confusion, medical units were being unloaded without their equipment. One field hospital had to be left behind because its equipment was not loaded in the transport assigned to it. In some instances, as much as a month elapsed before the equipment reached the specific unit.

Through use of captured Japanese medical supplies, the problem of caring for large numbers of civilians was eased. It had become so acute that one clearing company had to be set up as a hospital to care exclusively for civilians (fig. 125).

FIGURE 125.—Japanese medical supplies captured on Leyte were distributed to civilian hospitals and dispensaries.

Some units fared well. Lt. Col. John F. Wurz, MC, Surgeon, 32d Infantry Division, reported that efficient planning and supervision permitted superior routing and transporting of medical supplies. The medical supply dump was far enough forward so that all returning ambulances could carry supplies to the front as needed. Supplies were often carried to portable surgical hospitals and aid stations by native litter carriers. Emergency items were requested by radio or telephone and dropped from artillery and liaison planes. Very often, units on the frontlines received these emergency supplies in a matter of minutes.

Property exchange in air evacuation was nonexistent and, to alleviate the resultant shortages, weekly radio requisitions were sent to rear bases, requesting that stock of items lost through air evacuation be sent forward by any available air or water transportation. During this period of an insufficient number of beds, the Army was given much assistance by medical personnel of the U.S. Seventh Fleet which, in addition to providing the facilities of its floating hospital-type LST's (landing ships, tank), also furnished bed space in other types of ships.

During November and December, a total of 33 cases of poliomyelitis were reported. Three respirators were brought in to assist in the treatment of these cases, but because of the almost continuous operation of the respirators, repair part replacement became a major problem. In one instance, a complete respirator was received in lieu of repair parts requisitioned.

In the early stages of combat on Leyte, equipment was often transferred from one hospital to another. A typical example was the 58th Evacuation Hospital which, when moving out of an area and being replaced by the 18th Station Hospital, left all standing tentage, cots, blankets, and certain electrical equipment and, in turn, received replacements either from the 18th Station Hospital or from the Base K (Leyte) supply agencies. Some X-ray and surgical equipment was loaned to the 18th until it could unpack its equipment.[5]

CHANGES IN THE COMBAT SITUATION

During November 1944, the combat situation on Leyte was at a standstill, and it was felt necessary to commit more troops, which meant more medical supplies. To supply three additional infantry divisions, it was contemplated that eight medical maintenance units would be needed. Supplies of this amount were not available on Leyte, but it was believed that the necessary equipment could be obtained from New Guinea and from the San Francisco Port of Embarkation which supposedly had four ships in the area that could be diverted to Leyte.[6]

Support of the 77th Infantry Division

The 77th Infantry Division, veterans of the Guam campaign, had sailed from Guam early in November 1944 with a 30-day medical maintenance unit made up from items available in standard resupply blocks and from items drawn from local naval supply facilities. Tongue depressors, applicator sticks, atropine sulfate, and other similar items were not available in sufficient quantity to keep up with the daily demand.

After bivouacing near Dulag, the bulk of the division prepared for the invasion of the west coast of Leyte at Ormoc. Seven tons of the 30 days' medical maintenance unit, loaded at New Guinea, were loaded in the assault convoy in the initial landings. After gathering the components of the maintenance unit from the beaches, a medical dump was established near the division clearing station for resupply of frontline troops. This dump was moved forward with the clearing station, and facilities for resupply by ambulance

[5] (1) Manuscript prepared for a preliminary draft of this volume, covering medical supply activities of the Sixth and Eighth U.S. Armies, by Lt. Col. John M. Hunt, MSC, and Col. Albert E. Minns, Jr., MSC. (2) Quarterly Report, 32d Infantry Division, 1 Oct.–31 Dec. 1944. (3) Annual Report, 58th Evacuation Hospital, Southwest Pacific Area, 1944.

[6] (1) Memorandum, Col. William A. Hagins, Surgeon, Sixth U.S. Army, for G–4, Sixth U.S. Army, 24 Nov. 1944, subject: Medical Support of Five Additional Divisions in M–1. (2) Memorandum, Lt. John M. Hunt, MSC, Assistant Medical Supply Officer, Sixth U.S. Army, for Col. William A. Hagins, Surgeon, Sixth U.S. Army, 23 Nov. 1944, subject: Additional Medical Supplies on Leyte.

FIGURE 126.—Eighth U.S. Army headquarters being set up on the beach near Telegrafo, Leyte, 16 November 1944.

to frontline aid stations were always available. Piper Cub aircraft were frequently used to bring penicillin and other needed medical supplies to troops fighting in remote areas.

The offensive of the 77th Division as well as the push of the other four divisions brought an end to the operations of the Sixth U.S. Army on Leyte. On 26 December 1944, the responsibility for all future operations on Leyte passed to the Eighth U.S. Army (fig. 126).[7]

Operations of the 34th Medical Depot Company

On 1 December 1944, the 34th Medical Depot Company arrived at Leyte, relieving the 21st Medical Supply Platoon and the 2d Supply Team. With the action increasing in western Leyte during early 1945, a medical supply subdepot was established at Ormoc (map 43).

Meanwhile, construction of warehouses began in December 1944 (fig. 127). Rain and mud made both construction and the storage of supplies before

[7] Quarterly Report, Surgeon, 77th Infantry Division, October-December 1944.

FIGURE 127.—Lumber to be used in the building of the 34th Medical Depot Company at Tacloban, Leyte, 27 December 1944.

the completion of the warehouses nearly impossible. Materials-handling equipment was virtually useless. By the middle of March, however, the depot had completed two warehouses and had received forklifts and tractors which greatly reduced the labor involved in handling bulk supplies. Because of the establishment of air and water priorities, outgoing shipments tripled over the shipments of January.

The maintenance section of the 34th Medical Depot Company, by March 1945, was maintaining a 3-day deadline in returning repaired items. To offset a lack of spare parts, the ingenuity of the men in manufacturing needed items was invaluable.

Despite inadequate equipment on hand, the optical section of the depot managed to repair and replace more than 1,350 pairs of spectacles during January. By March, the section had eliminated a serious backlog of prescriptions. Many liberated prisoners, both officers and enlisted men, were issued new spectacles. During March, 4,024 prescriptions were processed.

On 17 May 1945, the 34th and the 78th Medical Base Depot Company, which had arrived from the United States on 31 January, were combined

to form the Base K Medical Depot under the command of Maj. (later Lt. Col.) Eli E. Daman, PhC. The depot supplied approximately 271,000 combat and service troops located in the Visayan Islands as well as a large number of Philippine Civil Affairs Units.[8]

Recommendations of the Voorhees Survey Team

When Col. Tracy S. Voorhees, JAGD, visited Base K in early December 1944 as a part of his survey of Pacific supply facilities, he noted several serious deficiencies. At that time, no depot construction was going on; therefore, stocks were deteriorating because of the damp weather conditions. Certain items of medical supply were out of stock, and it was impossible to fill some requisitions. Some of the shortage seemed to be caused by delay in unloading ships, and Colonel Voorhees recommended that hospital ships be used to bring in supplies. It was also suggested by Voorhees that the medical supplies be "top loaded" in the San Francisco Port of Embarkation. According to Colonel Voorhees, unbalanced stocks and shortages were caused by delays in interdepot shipments and the lack of aggressive action by the medical section of the Distribution Division. As a solution to these problems of distribution, it was suggested that emergency requisitions by air shipments be initiated for badly needed items.[9]

Clearing the Way for the Invasion of Luzon

To provide adequate air cover for convoys proceeding to Lingayen Gulf for the invasion of Luzon, it was necessary to clear the island of Mindoro of enemy troops and develop airbases. This task fell to the Western Visayan Task Force which was composed of elements of the 24th and 21st Infantry Divisions and the 503d Regimental Combat Team. The assault began on 15 December 1944, and the island was secure by 31 January 1945.

Initial medical supplies, five medical maintenance units, were stored at San Jose under the control of the 13th Station Hospital. After the initial phase of the operation, the dump was moved to Gil Airdrome. Resupply for Mindoro came from four preloaded ships, each with a 30-day supply, which came from the San Francisco Port of Embarkation (map 44).[10]

MEDICAL SUPPLY SUPPORT OF THE LUZON OPERATION

The Luzon Campaign, the largest operation in the war against Japan, was highly significant in that it completed the reconquest of the Philippines.

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[8] (1) Quarterly Reports, 34th Medical Depot Company, January-October 1945. (2) Historical Summary, 78th Medical Base Company, 15 Apr. 1946.

[9] Memorandum, Col. Tracy S. Voorhees, JAGD, for Commanding General, U.S. Army Services of Supply, 11 Dec. 1944, subject: Medical Supply Supplementary Report Covering Base K and Plans for Base M.

[10] (1) For a further detailed description of the Mindoro operation, see Smith, Robert R.: Triumph in the Philippines. United States Army in World War II. U.S. Government Printing Office, 1963, pp. 43–54. (2) See footnote 2 (2), p. 485.

Map 44.—Medical supply facilities on Mindoro, 15 December 1944.

The confusion and slow development at Leyte had caused a postponement of this operation from 20 December 1944 to 9 January 1945.

During the planning phases, many complexities were encountered. Because the Japanese were known to utilize the terrain to the maximum, it was expected that the enemy would make several strong stands in the mountainous areas, and at Bataan and Corregidor. To support the U.S. operations, equipment and supplies were brought in from widely scattered areas of the Pacific as well as from the United States. Very little difficulty was experienced

in procuring supplies, medical units, and shipping space for this operation. Supplies were available in noticeably increased quantities.

Early Supply Support

The initial landing at Lingayen Gulf on 9 January 1945 involved the I and XIV Corps, each with two divisions and supporting troops. The 21st Medical Supply Platoon (Aviation) was designated to operate the Sixth U.S. Army medical supply point in support of the I Corps. While staging on Leyte, the 21st was augmented by the addition of 20 men and 4 trucks which would speed the delivery of medical supplies to corps supply points. Again, as in Leyte, the medical supply plan called for large quantities of resupplies, including blankets, litters, splints, plasma, whole blood, and biologicals, to be brought in during the assault phase and left on the beach where they would be accessible to initial medical aid personnel; and, when the beaches became secure, the supply platoons were to collect the remaining supplies.

As a result of the continuous flow of casualties over the beaches, blankets became a critical item. To alleviate this situation, blankets which had been set aside for the burial program were utilized, and shelter halves were substituted for blankets in the burying of the dead.

Initially, a detachment of the 21st Medical Supply Platoon (Aviation) established a medical supply point at Lingayen in a marketplace which provided a good concrete floor, but no overhead protection. To overcome this, tarpaulins and palm leaves were used as a roof. When the supplies were moved to Dagupan, open storage was all that was available. As a result, loss of supplies from deterioration was high (map 45). This detachment had four mobile refrigerator units filled with whole blood, penicillin, sera, vaccines, and various other biologicals to be used by the troops during the early stages of the operation.

On 11 January 1945, the first group of the Medical Section, Base M, landed on the beach of Lingayen Gulf near San Fabian, 2 days after the main landing force. To take full advantage of his experience in establishing base sections, Col. (later Brig. Gen.) Edgar King, MC, was designated surgeon. Accordingly, he had personnel from his group accompanying each load of supplies to assure segregation and to secure a location of the medical dump. In this instance, the Medical Section had acquired a few buildings in the public market on the outskirts of town, and supplies were moving to storage before the day was over.[11]

Movement Toward Manila

By 13 January, the 21st Medical Supply Platoon had set up a supply point at San Fabian; but on 23 January, this point was turned over to the 49th Medical Depot Company and the platoon proceeded to Tarlac, which was ideal-

[11] (1) Quarterly Report, Surgeon, Sixth U.S. Army, January-March 1945. (2) Operational History, Surgeon, Sixth U.S. Army, 1945 (Luzon Campaign).

Map 45.—Medical support for the Luzon operation, January-June 1945.

ly located to support a large number of medical treatment facilities. Medical supplies reached Tarlac from Lingayen Gulf by truck and rail and were received and distributed by the 21st, assisted by the 55th Medical Supply Platoon (Aviation) which was in support of the XXIV Corps.

The 49th Medical Depot Company, with its three storage and issue platoons operating separately, had the task of receiving and storing supplies which had come into San Fabian by water and transshipping them to Tarlac and Urdaneta, where the 15th Medical Supply Platoon (Aviation) was operating in support of the I Corps (map 45). The 49th was handicapped somewhat by failure of equipment to arrive. It became necessary to leave behind, in the depot, mobile refrigerators which were part of the Army Blood Bank so that whole blood and biologicals could be stored. The lack of maintenance

Map 46.—Medical supply depots at Subic Bay and the Manila Bay area, 1945.

equipment and an optical repair unit resulted in much unserviceable equipment remaining in poor condition.

On 30 January, a medical supply point was established at Subic Bay by the XI Corps. Operated by the medical supply officer, XI Corps, and a detachment of enlisted men from the 113th Medical Battalion of the 38th Infantry Division, this supply point was the source of medical supplies for the Corregidor and Bataan operations. Six medical maintenance units arrived on the first medical supply echelon to that area, and 19 airdrops and shipments of medical supplies occurred early in the operation (map 46).

By 6 February, the 55th Medical Supply Platoon, which had previously been supporting the 21st Medical Supply Platoon in the operation of the depot at Tarlac, entered Manila and unloaded its equipment and five truckloads of medical supplies on the grounds of Santo Tomas University before moving to the George Washington School on the next day. For the next 2 weeks, the 55th supplied all troops in the Manila area (map 46). Relieved by the 15th Medical Supply Platoon on 18 February, the 55th proceeded to Urdaneta to support the I Corps Army Air Forces, and Army Service Command troops in that area.

The medical supply depot in Manila was more permanently set up under the stands of the Manila baseball stadium, and medical supplies were trucked in from the depot at Tarlac. By 29 February, when the city of Manila was secure, the 49th Medical Depot Company, relieved at San Fabian by the 58th Medical Base Depot Company, moved to Manila and set up in warehouses in the vicinity of Manila Harbor (fig. 128). After the harbor had been cleared of mines, boobytraps, logs, stumps, and other debris, the area was ready to receive supplies from preloaded ships, which were unloaded at the repaired docks and carefully stored according to type of item.

On 12 March 1945, the 21st Medical Supply Platoon was replaced at Tarlac by the 58th Medical Base Depot Company and the 55th Medical Supply Platoon (Aviation) which had been at Urdaneta since mid-February. Between 12 and 21 March, 350 requisitions were filled. The 21st moved to Urdaneta where it maintained a reserve stock of supplies. After closing the depot at Urdaneta on 24 March, the unit moved to San Jose with a 15-day supply level to support I Corps troops in that area.[12]

Problems of Resupply

From D-day, 9 January, to 31 March 1945, 28 block-loaded ships, carrying 56 medical maintenance units, arrived in the Luzon area from the San Francisco Port of Embarkation. This represented a 30-day supply for 560,000 troops. As experienced in other operations and in other theaters, many blocks of supplies were unbalanced with overages in some nonessential items, such as boric acid, oxygen, dextrose in normal saline solution, prophylactics, sheet wadding, and plaster of paris bandages. Ironically, an oxygen shortage developed because of the failure to refill empty cylinders. Radio requests to rear bases for mechanical prophylactics were evidently ignored until 25 February when 4,000 gross of mechanical prophylactics were received and followed up by 1,123 gross received by air. Five percent dextrose in normal saline solution was short because of the increased use of this item in the treatment of hepatitis.

The increased use of sheet wadding and plaster of paris bandages in the treatment of soft tissue wounds and fractures had caused shortages of these items.

During January through March 1945, 66 airdrops totaling 27,000 pounds of supplies were made by the 11th Cargo Supply Group. Forty-six of the airdrops were made for guerrillas (fig. 129).[13]

Continued Supply Support

Fighting in the southern part of Luzon and in the mountainous regions was going on while cleanup of Manila was in progress. On 30 March, the 15th

[12] (1) Quarterly Reports, 49th Medical Depot Company, 1945. (2) Quarterly Reports, 15th Medical Supply Platoon (Aviation), 1944–45. (3) Quarterly Reports, 55th Medical Supply Platoon (Aviation), 1945. (4) See footnote 11 (2), p. 495.

[13] Quarterly Reports, Surgeon, Sixth U.S. Army, January-June 1945.

FIGURE 128.—Issue warehouse, 49th Medical Depot Company, Manila.

Medical Supply Platoon (Aviation) was relieved in Manila and proceeded to Batangas (Batangas Province) to establish an Army medical supply depot in that area in support of XIV Corps, Army, and Services of Supply units. The initial supply of four medical maintenance units was received. The Batangas supply point closed on 22 May and the unit moved to Lipa where it continued to support the XIV Corps (map 47).

The responsibility of mopping up on Luzon passed from the Sixth U.S. Army to the Eighth U.S. Army in June 1945, when the Sixth U.S. Army was assigned the responsibility of training and reequipping units for the invasion of Japan.

The 61st Medical Base Depot Company, which had been operating at Base X (Manila) after arriving on Luzon on 19 March, sent a detachment of one officer and nine enlisted men on 29 June to San Jose, where it assisted the 55th Medical Supply Platoon (Aviation) in the operation of a transshipment point. Another detachment of 2 officers and 20 enlisted men was sent ahead to Bayombong, where it set up the distribution point for troops operating in the Cagayan Valley. Supplies were received by rail from San Jose and shipped out to units by truck (map 45). A third detachment of the 61st, consisting of one officer and six enlisted men, set up a point at Aparri on the north coast of Luzon. One medical maintenance unit was used to supply troops in the immediate area and as far south as Tuguegarao.[14]

[14] (1) See footnote 13, p. 498. (2) Quarterly Reports, 61st Medical Base Depot Company, 1945.

FIGURE 129.—Medical supplies being packed in an 80-inch howitzer canister to be dropped to forward units on Luzon, 29 April 1945.

MEDICAL SUPPLY IN THE SOUTHERN PHILIPPINES

While the fighting on Luzon was well underway, operations against the Japanese in the southern Philippines had begun with invasions of Palawan, the western-most island in the archipelago, and the Zamboanga Peninsula of southwestern Mindanao. These areas were of vital importance as potential sites for airfields.

Supplies for the Palawan Operation

In the Palawan operation, which began on 28 February, the task force, composed principally of the 186th Regimental Combat Team backed up by certain nondivisional units, carried in a 15-day level of supplies and set up a supply point in the 168th Evacuation Hospital near Puerto Princesa city.

A 60-day resupply was further augmented by two block-loaded ships which arrived in the area on 6 March and 1 April, respectively. All emergency

Map 47.—Medical supply depots in southern Luzon, 1945.

radio requisitions were made to Base K and delivery was made in a matter of hours either by evacuation planes or by an Eighth U.S. Army courier plane.

Support of the Zamboanga Operation

The Zamboanga operation, launched on 10 March 1945, was designed to push the Japanese from southwestern Mindanao and thus provide additional airstrips. Troops of the 41st Infantry Division carried 15 days' initial supply. Requisitions prepared for the operation consisted of 30 days' resupply, and further resupply was provided by two block-loaded vessels arriving in Zamboanga on 18 and 30 March.

A divisional medical supply point was established in prefabricated warehouses at Zamboanga (fig. 130) by the division medical battalion (map 48).

Supply Support for Central Visayan Operations

Even before the Zamboanga-Sulu region had been secured, the Eighth U.S. Army initiated operations to secure the central Visayan Islands of Panay and Negros. The reinforced 40th Infantry Division and the 503d Parachute Regiment were prepared for this assault.

FIGURE 130.—Taking inventory in the Medical Supply Issue Section of the 41st Infantry Division, Zamboanga, 30 March 1945.

After launching its assault on Panay on 19 March 1945, the 40th Division established a medical supply point in an existing building in Iloilo (map 48). When they arrived in the operational area, the division had 15 days of initial supplies. Requisitions for 30 days' resupply were prepared and sent to Base K. Further resupply was furnished by block-loaded ships, one arriving at Iloilo on 25 March. Emergency radio requisitions for items such as whole blood, penicillin, biologicals, and other critical items were forwarded by the division to Base K. Delivery was usually accomplished within a matter of hours by the use of evacuation planes bound for the operational area or by use of the Eighth U.S. Army courier plane.

The assault troops of the 40th Division carried 160 pints of whole blood into the operation. Flown to the division were 1,424 pints, making a total of 1,584 pints of whole blood used.

During the latter phase of the operation, the 52d and 53d Infantry Regiments (Philippine Army) were activated on Panay and Negros Islands. Requisitions for medical supplies and equipment for these units and their attached service units were prepared by the 40th Division, edited by the Eighth U.S.

MAP 48.—Medical supply in the southern Philippines, 1945.

Army, and filled by Base K. Shipment of the same was made to supply officers of the regiments concerned.

On 26 March 1945, the Americal Division launched a three-part operation to clear Cebu Island, Bohol Island, and the southern section of Negros Island.

The initial supply and resupply for the operation was the same as in the Panay-Negros operation. In the initial landing, Americal Division troops carried in 192 pints of whole blood. Additional amounts required were ordered from Base K and were delivered by evacuation plane or courier plane. A total

of 2,648 pints of blood were received by the Americal Division during the operation. On 15 June 1945, all supply responsibility for Cebu was assumed by Base S, established on that island.

Supply Support for the Conquest of Eastern Mindanao

Eastern Mindanao, the remaining Japanese-held area of the southern Philippines, was the target of the 24th and 31st Infantry Divisions of the X Corps which landed on 17 April at Illana Bay. Troops of the X Corps carried in a 30-day initial supply of medical items. Requisitions for automatic resupply were initiated by the X Corps and delivered by four double-block loaded ships from the San Francisco Port of Embarkation.

The Commanding General, X Corps, was responsible for the maintenance of a 30-day level of medical supplies and for the storage and distribution of medical supplies and whole blood in the objective area.

The only major supply problem was the procurement of sufficient refrigeration for medical units. Temporarily, an Australian-made mobile refrigeration unit was used in the 656th Clearing Company.

By 21 April, the 74th Medical Base Depot Company was operating a medical supply point at Parang in squad tents (fig. 131). Prefabricated buildings allotted to house the depot were never erected at Parang because of plans to move to Agusan by 11 June (map 48).

Emergency requisitions, mainly for oxygen and biologicals, were sent directly to Base K, and shipments were expedited by use of the 403d Troop Carrier Group evacuation planes which were bound for the particular area where the supplies were needed.

Units carried 1,064 pints of whole blood into the operation. Automatic resupply of whole blood to X Corps at Malabang was established at 240 pints every 3 days. Shipments commenced on 27 April and continued until 19 June when automatic resupply was diverted to Valencia and Libby airfields.

Following a field inspection held on 7 June, it was recommended that the 99th Evacuation Hospital, which was supporting the advancing 31st Infantry Division, be supplied with the equipment needed to expand an additional 250 beds. The requisition was initiated by Headquarters, Eighth U.S. Army, and the necessary equipment was flown in immediately by evacuation planes.[15]

Lessons Learned in the Philippine Islands Campaign

In the Philippine Islands Campaign, medical supplies were generally plentiful. However, it became evident, particularly in Mindanao, that it was a necessity to have adequate refrigeration for blood, penicillin, and other biologicals made available to all units before embarkation to avoid resulting shortages caused by reallocation.

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[15] This section is based on (1) Annual Report, Medical Department Activities, Eighth U.S. Army, 1945, and (2) Quarterly Reports, 74th Medical Base Depot Company, April-December 1945.

FIGURE 131.—A. Interior view of a medical supply tent at the 74th Medical Supply Dump, Parang, Philippine Islands. B. Soldiers set up the 74th Medical Base Depot Company at Parang.

In this campaign, more than in any previous operation, the use of evacuation and courier planes for swift delivery of emergency items of requisition proved invaluable in the saving of human life. Close coordination between Base K and troop carrier air groups made this possible.

In the Leyte operation, especially, it was learned that the normal medical maintenance unit could not be relied on, as there were excessive amounts of little-used items like X-ray supplies, acetone, Mapharsen, and absorbent cotton in 1-pound rolls while items, such as foot powder, tincture Merthiolate, aspirin, and hydrogen peroxide, were in scarce supply.[16]

[16] See footnotes 2(1), p. 485; and 15, p. 504.

CHAPTER XV

The China-Burma-India Theater

BEGINNINGS OF MEDICAL SUPPLY ACTIVITIES IN 1942

Theater Background

The CBI (China-Burma-India) theater,[1] which evolved from the American Military Mission to China established in October 1941, did not become fully organized as a theater until 22 June 1942, when the War Department ordered Lt. Gen. (later Gen.) Joseph W. Stilwell to issue orders relieving all units under his command from assignment to Army Group, Washington, D.C., and reassigning them to the American Army Forces, China, Burma, and India. By 6 July, General Stilwell had set up the command structure for his theater. From a small task force organized to support China and encourage larger participation and effort on the part of the Chinese Army, this mission of the CBI theater developed to include the operation of airbases for actions against Japan and the organization of various types of American units to wage guerrilla warfare against the Japanese.

Organization of Services of Supply and the Supply System

In the spring of 1942, efforts had been made by the Theater Surgeon, Col. (later Brig. Gen.) Robert P. Williams, MC (fig. 132), to organize the Chinese Medical Service, to deploy the small Seagrave medical unit, and to relieve the inadequacy which existed. Supplies had been stored in depots at Mandalay and Lashio, Burma; Calcutta and Karāchi, India; and in China.

Having reached the theater in late March 1942, Lt. Col. (later Col.) John M. Tamraz, MC (fig. 133), was designated Surgeon, SOS (Services of Supply), and his headquarters was established at Karāchi. The primary responsibility for organizing a medical supply program fell on Colonel Tamraz, and on 1 April 1942, he asked for the establishment of a medical supply depot at Karāchi with 2 officers and 10 enlisted men.

Effort was made by Colonel Tamraz to locate a source of supplies which could be substituted for unavailable shipments from the United States. The British Army's medical supply depot at Karāchi had sufficient stores of many items to supply the American troops in India through Reverse Lend-Lease. The surgeon was also allocated $3 million to purchase medical supplies on the

[1] (1) Stone, James S.: Organization and Development of Medical Supply in India and Burma, 1942–46. [Official record.] (2) Romanus, Charles F., and Sunderland, Riley: Stilwell's Mission to China. United States Army in World War II. The China-Burma-India Theater. Washington: U.S. Government Printing Office, 1953.

FIGURE 132.—Brig. Gen. Robert P. Williams.

local market; yet, during 1942, various supply problems plagued the Medical Department. The 500 tons of medical supplies reportedly on the way to the theater were slow in arriving. Six hospital units arrived in May and June without any equipment and placed a heavy demand on the medical supply system. Supplies allocated to the U.S. Public Health Service and designated for the treatment of personnel involved in the construction of the Yunnan-Burma Railway, Chinese Defense supplies, and American Red Cross supplies all had to be used by Services of Supply.

Much material designated for China could not be used in India or Burma to the regret of Colonel Tamraz who stated that these supplies would often stay on the Calcutta docks and would gradually deteriorate.

When medical supplies began to arrive in late May 1942, warehouse space was hard to find, and when found, it had to be cleaned and reconditioned.[2]

The American Medical Supply System, during 1942 and 1943, was based on the automatic issue of the 10,000-man, 30-day MMU's (medical maintenance units). In July 1942, Charleston, S.C., was designated as the port of embarkation for the China-Burma-India Theater, and a theater supply level was established at 180 days.

[2] Diary, Col. John M. Tamraz, MC, Chief Surgeon, Services of Supply, China-Burma-India Theater. [Official record.]

FIGURE 133.—Col. John M. Tamraz, MC, SOS Surgeon.

The previously requested medical supply detachment reached the theater by July, and a Medical Supply Section was established in the general depot at Karāchi (map 49).

Despite the arrival of several shipments of medical supplies, a shortage of sulfaguanidine, Atabrine (quinacrine hydrochloride), Plasmochin (pamaquine naphthoate), and nicotinic acid was revealed when a request for these items from a training center at Rāmgarh, India, was by necessity turned down.

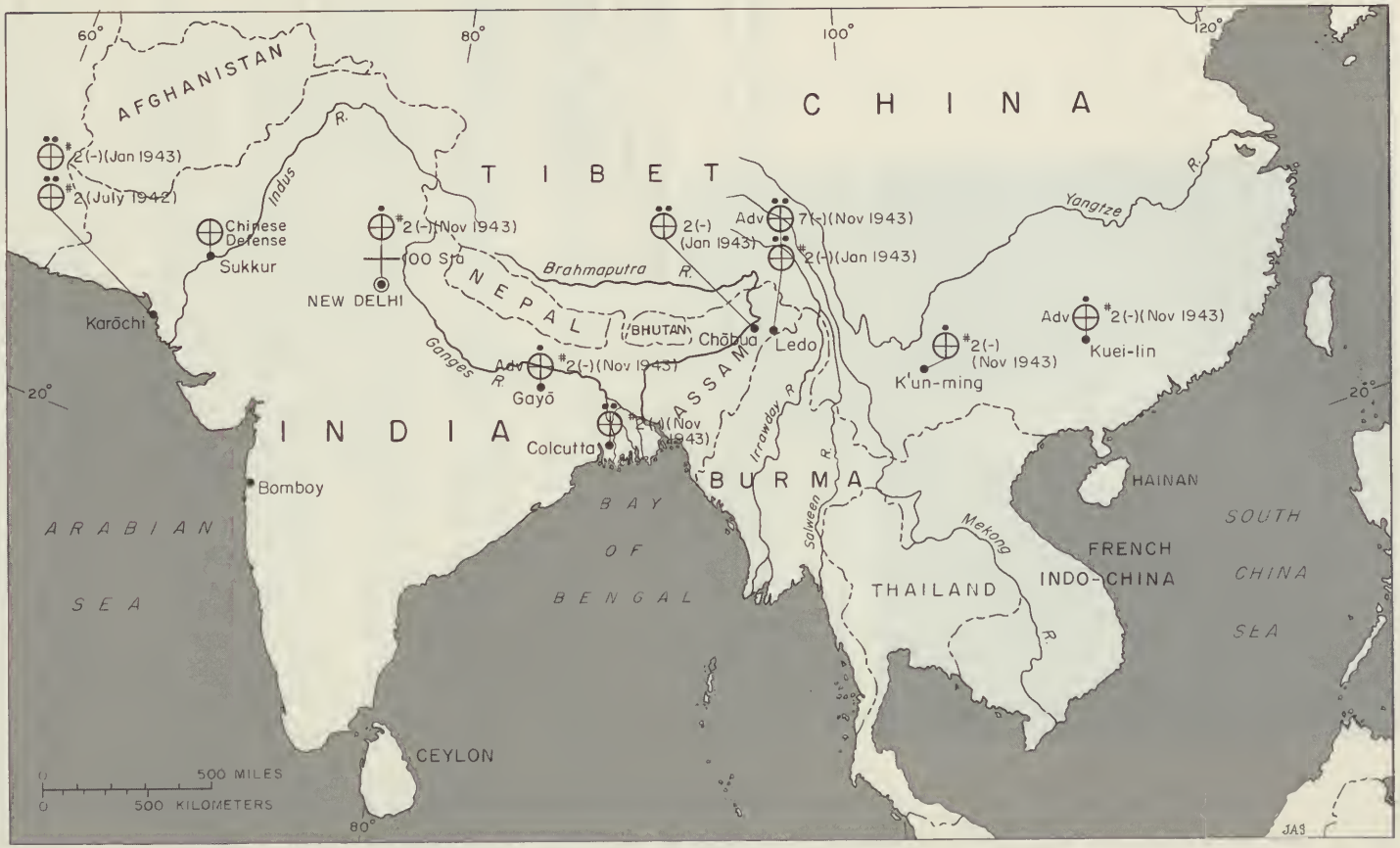
A major problem in the CBI theater during the first year of operation was lack of the medical supply personnel required to plan for and carry out the distribution of supplies.

Because Chinese medical treatment facilities were relatively limited in scope, it was initially decided that the medical maintenance units furnished to the forces in Yunnan (Y-Force) should be modified by eliminating laboratory, dental, X-ray, and elaborate hospital equipment, and special supplementary drugs and chemicals. This modification of the standard unit established two noninterchangeable MMU's within the system.

The biggest problem of 1942 seemed to be the lack of a supply program with uniform policies and systems. This problem plagued the theater for the next year and a half.

GROWTH OF MEDICAL SUPPLY

Early in 1943, Maj. Walter J. Newton, DC, was placed in charge of the Medical Supply Section, Surgeon's Office, SOS. During January and February 1943, the movement of material into the Ledo area in preparation for



Map 49.—Medical supply depots, CBI theater, 1942–43.

the beginning of road construction in March was the principal medical supply project. Special MMU's were lined up to supply the Seagrave unit which had been active in Burma during the first Burma Campaign of 1942 and had been providing medical care for the Chinese at Rāmgarh. The Karāchi medical depot and its subdepot at Chābua, India, had been ordered to assemble medical maintenance units designed by Lt. Col. Gordon S. Seagrave, MC, and ship them to Ledo. Supplies were funneled into Ledo, which was to serve as a receiving area for 30,000 troops being sent from the United States to launch the construction program. A request for equipment and supply units for hospitals of 250 beds, 100 beds, and 50 beds was approved, but consolidation of hospital beds was impossible, making it necessary to place small hospital units at widely scattered points.

The SOS Surgeon, while on an inspection tour during April and May 1943, discovered that most depots were below supply levels. The worst situation was at K'un-ming, China, because of the difficulties in getting supplies over the Hump by air.

Although the supply depot at Ledo was scattered in several warehouses, it seemed to be accomplishing its purpose. The depot at Chābua (map 49), in contrast, was quite low on surgical supplies, sulfonamides, and dental equipment.

Support of Chinese Forces

According to surveys of Chinese troops in the CBI theater, the Y-Force had sufficient supplies and equipment on hand for 6 months of combat. Only a shortage of vehicles for the transportation of equipment and supplies handicapped their supply operations (fig. 134). Action was taken by the Chief Surgeon, SOS, to provide for automatic replacement of depleted medical supplies. For the eastern group, the Zebra or Z-Force, the necessary requisition to provide 30 Chinese defense supply medical maintenance units per month was being prepared. A shift of responsibility for Chinese defense supplies to rear-echelon headquarters at this time relieved the theater surgeon of an onerous task.

Supply of Antimalarial Drugs

With the approach of summer and the malaria season, shortages of malaria control supplies and equipment appeared. Delays in requisitioning, loss of supplies due to sinkings of cargo vessels, and the rapid growth of troop areas, caused an emergency situation. As late as July 1943, no antimalarial supplies of U.S. origin had reached Assam. Only British and Indian equipment, generally considered by Americans to be inferior, was available, but this was also being depleted rapidly.

The large number of Chinese soldiers and Indian coolies employed in construction and maintenance enlarged the antimalarial supply problem since they had to be provided for as well. Approval for additional supplies was received too late to produce the supplies in time for the malaria season. To

FIGURE 134.—Typical pack train fording a river near Nasin, Burma.

alleviate this situation, all equipment and supplies in the antimalarial category were concentrated in the Medical Supply Section of the Base General Depot at Calcutta under the supervision of a malaria control supply officer. Assistant theater malariologists, in cooperation with depot officers, approved distribution of these supplies. This system of depot control permitted the most economical supply distribution.

Plans for Increased Support for Chinese Troops

During July 1943, plans were formulated for supplying Chinese troops in both India and China. Full delivery of table of basic allowances equipment for medical units of the Y-Force was guaranteed by 30 medical maintenance units per month beginning in March 1944.

Shipment of Medical Maintenance Units to the CBI Theater

The CBI theater's supply program was set back in midsummer 1943 by the arrival of broken or partially complete assemblies, which the subdepots had to reconstitute as MMU's before requisitions could be filled. This problem

was aggravated by lack of personnel qualified to handle these incomplete units. When ships were sunk en route to the theater, MMU components were lost, thus delaying the schedule several months. Theater stocks remained unbalanced until repeat shipments could be made.

Army Air Forces Medical Supply

In August 1943, the Army Air Forces proposed a supply system of its own, which would interpose Air Service Command medical supply points as "wholesalers" between Services of Supply depots and the using units. The Air Forces proposed to stock these depots with a 90-day level of common-use medical supplies and to handle all special items of equipment peculiar to the Air Forces. Services of Supply would thus act only as a feeder to the Air Service Command depots and cease issuing directly to AAF (Army Air Forces) units.

With the Air Forces taking over responsibility for supply to its units, Services of Supply would be relieved of an extra burden, but Colonel Tamraz and his medical supply officers agreed that the AAF proposal would establish a duplicate system of medical supply distribution and further deplete the already short stocks. By September, a compromise had been worked out whereby a 30-day supply was to be stocked by air depot groups, a 30-day supply by Air Service Centers, and a 10-day additional supply by tactical organizations.

The Medical Depot System in 1943

During the final quarter of 1943, many problems of the medical supply system were in the process of being solved. There was a mixture of optimism and misgiving by medical supply authorities. The medical supply officer, SOS, recorded a 117-day level of supplies in September which was somewhat below the authorized 180-day level. The antimalarial supply level was reduced from 60 to 90 days to 30 days because considerably more supplies were en route to the theater.

By November 1943, general depots with medical sections were located at Karāchi and Calcutta. An intermediate general depot was located at New Delhi, with the 100th Station Hospital serving as a subdepot for troops in the vicinity of the theater headquarters.

Advance general depots were located at Gayā, India; Chābua, the transshipment depot for supplies going by air to China; K'un-ming, the China depot; and Kuei-lin, China, which served the advance bases of the Fourteenth Air Force. Seven additional depots were operated by the Army Air Forces in eastern India to serve the Air Transport Command and the Tenth Air Force bases. Special depots for Chinese defense supplies were located at Karāchi, Sukkur, Calcutta, Chābua, and K'un-ming. A railhead depot served the Ledo area with a 45-day stockpile in the Advance General Depot at Chābua (map 49).

Early Supply Procedures

Late in 1943, the Surgeon's Office, SOS, was developing a system of stock control and inventory for medical supplies in the theater. SOS headquarters was the final authority for processing all requisitions before they were sent to a depot. They also controlled hospital equipment assemblies and replacement items and were the responsible agents for procurement of priority items.

Emphasis on Experienced Personnel

Despite the optimistic outlook of the SOS Surgeon concerning the availability of supplies, general concern was felt over the nonavailability of trained supply personnel.

At the close of 1943, only two small medical supply units were in operation in the CBI theater. Sections of Medical Supply Detachment No. 2 staffed the depots at Karāchi, Calcutta, and Chābua, with the help of local personnel. The Ledo supply point was manned by a section of the Advance Depot Platoon, 7th Medical Supply Depot. A personnel shortage was expected to remain until sometime in 1944 despite the fact that two depot companies were on requisition.

Elimination of the Medical Maintenance Units

In October 1943, the War Department announced that automatic shipment of medical maintenance and medical reserve units would be discontinued by 1 January 1944. Estimates made by the Los Angeles Port of Embarkation showed that a 160-day supply of MMU's was either in the theater or en route, and a 178-day supply was on order. It was estimated that a 66-day supply of medical reserve units was either in the theater or en route, with a 77-day reserve on order.

Beginning in 1944, requisitions were to be submitted for maintenance to provide an 80-day supply in the theater as well as a 210-day supply to cover timelags. The Los Angeles Sub-Port, which became a port of embarkation for this theater in May 1943, recommended that requisitions be submitted once a month for a 30-day supply that would be required 210 days later, meaning that supplies requisitioned in November 1943 would not arrive until June 1944.

Following this change in procedure, the medical supply officer, SOS, planned to consolidate all theater requisitions each quarter and to submit special requisitions as necessary. His records were to show the status of all items stocked in the theater, and his procurement policy would be directed by a three-phase estimate system which calculated the stocks on hand for the current quarter, stocks due from the port of embarkation for the following quarter, and stocks to be requisitioned at the beginning of the first quarter for use during the third and fourth quarters. It was contemplated that MMU's would continue to be issued for 2 of the 3 months in each quarter,

with the quarterly item-by-item requisitioning being used to balance theater stocks. The first requisition was scheduled for dispatch on 1 January 1944. The emphasis of the new system on proper accounting procedures resulted in timidity on the part of SOS medical officers. The medical supply officer, Major Newton, was relieved of his supply duties in October so that he might devote full time to dental service. His replacement, Maj. (later Lt. Col.) Claud D. La Fors, PhC, was experienced in medical supply, but his arrival was delayed. In the interval, no advance requisition was placed sufficient to maintain adequate stock levels between the close of automatic supplies and the date at which requisitioned supplies would be received.

Failure of British Supply

At the end of 1943, one of the major flaws still existing in the CBI supply system was the failure of Chinese forces in India, the X-Force, to be supported by the British and by the Government of India. Only approximately 25 percent of requested medical support requirements were received, and these were not up to established standards or familiar to U.S. medical personnel. To take up the slack, it was necessary to divert MMU's from other forces for the use of the Chinese Army in India.

MEDICAL SUPPLY DURING 1944

Inspection of the Supply System

When the new theater medical supply officer finally arrived, an inspection trip of supply facilities was arranged to familiarize him with the existing situation. Almost complete collapse was discovered at K'un-ming, where only the bare necessities were available. No reserve existed and many items were completely out of stock. The medical supply officer had files of requisitions which had been disapproved by the SOS Surgeon. Bad flying weather also hindered delivery of requested items over the Hump.

After inspection at one end of the supply line, Major La Fors and the AAF medical supply officer inspected the depot at Chābua, the final base for medical supply points in China and a key link in the chain of supply leading to Ledo and Burma. There, expendable supplies were nearly depleted and nonexpendable supplies were scarce. Only Chinese defense supplies, not available for U.S. use, were in quantity, and these were scattered in poorly constructed, poorly managed warehouses.

At Ledo, special efforts were made to push medical supplies forward into combat areas. Supplies for American medical units were adequate, but supplies for Chinese combat troops were at a low level. Consumption was 100 percent over estimated requirements because of losses connected with airdropping of supplies as well as wasteful habits of the Chinese. As a result, supplies were

being depleted rapidly while the replacement system still functioned at the old standard.

At General Depot No. 2, in Calcutta, the medical supply officer found a large but unbalanced stockpile of supplies in the Medical Section. It was estimated that if these supplies had been properly distributed to the field, the theater supply situation would have been nearly adequate. It was ascertained, however, that the flow of supplies from the Zone of Interior was interrupted by failure to requisition supplies as soon as automatic shipment of medical maintenance units was discontinued.

The biggest defect in the theater supply system was maldistribution. The general depot in Karāchi had only a 48-day supply on hand for 25 percent of the theater personnel; the general depot in Calcutta, which supplied 75 percent of the theater strength, had only a 70-day supply in stock. At the Chābua depot, all that was available was 63 days of a 90-day supply for Chinese troops and a 45-day supply for troops in Burma.

Corrective Action

Faced with the task of reconstructing the medical supply system, the Medical Supply Section personnel requisitioned needed supplies for immediate shipment to the theater, requesting at the same time that MMU's sufficient to maintain supply levels be sent for use until the requisition was received.

The theater medical supply officer directed discontinuance of all unauthorized methods of procuring or issuing supplies and also strict adherence to theater policies. This policy was designed to eliminate leapfrogging requisitions to the SOS Surgeon or even directly to the port of embarkation in the Zone of Interior. Supplies were to be procured only from the SOS depot in the immediate vicinity. Army Air Forces supply officers were directed to put requisitions through the air depot and Air Service Command, as authorized by SOS Memorandum No. 187 of 1 November 1943.

To fix responsibility in the field, medical supply officers of the general depots were designated as area supply officers and directed to establish and maintain authorized levels of supply at all supply points within their respective areas. Stocks on hand were to be surveyed and suitable requisitions sent to adjust discrepancies. They were also directed to edit and fill requisitions for units in their areas.

As a result of frequent inspection, these area supply officers were ordered to eliminate hoarding of supplies and to make certain that excess and unauthorized equipment was returned to depot stocks. The Stock Record Card System was adopted, and the standard revised requisition form was put to use. Despite the unfamiliarity of medical supply officers with the new procedures, they began at once to institute the new system.

To further invoke the provisions of new theater directives on supply procedures, it was necessary to improve the personnel involved in the program's

operation. The medical supply officer outlined the staff he wanted to develop in the Surgeon's Office, SOS, to maintain control of the supply system. It was recommended that three officers deal with procurement, malaria supply control, and other theater supply matters. It was also recommended that an attached officer from Air Service Command establish liaison between Services of Supply and Air Service Command on medical supply matters.

None of these recommendations was adopted. Instead, the medical supply officer had three commissioned assistants, two of whom, being very inexperienced, were poorly qualified for a responsible role. An AAF liaison supply officer was borrowed from Army Air Forces headquarters.

With the arrival of new medical supply officers from the States, a new officer was assigned as assistant to the chief of the section, and he and the chief handled most of the supply matters. This system lasted until late 1944 when the two officers were replaced by one Medical Administrative Corps officer. The Air Forces liaison officer remained until midsummer.

Medical Depot Companies Organized

Personnel problems evident at the command level were also existing in the field. Of the two medical depot companies requisitioned in 1943, only one had reached India by December 1943. After almost a year of basic and unit training, the 14th Medical Depot Company arrived in India and was assigned to General Depot No. 2, Calcutta, to relieve the provisional detachment (fig. 135). Plans were made at that time to send advance detachments to K'un-ming, Ledo, and Chābua. No separate medical supply units had been functioning in that area before detachments of the 14th arrived. At Ledo, the 14th detachment, of one officer and six enlisted men, augmented Section 1, Advance Depot Platoon, 7th Medical Supply Depot, which had been there since the depot was established in November 1943 (map 50).

Valuable time was lost at the general depot when, because of disagreement over who was in authority, the depot company was not able to deploy its full strength and time on the distribution of medical supplies.

Supply Shortages in the Field

To avert serious shortages at Chābua, 10 medical maintenance units were planned to be shipped there immediately. Chābua was the key point for the supply of the Ledo and K'un-ming depots, and this shipment helped to relieve a serious shortage. By 10 January, the level of supplies had dropped to 1.5 MMU's. Emergency arrangements provided for the transportation of critical items to balance the stock level until March.

As the depot at K'un-ming was nearly out of supplies by January, two MMU's were prepared for air shipment to the depot (fig. 136).

The uncertainty of transportation between Calcutta and Chābua was a real handicap, and little could be done about it at that time.

MAP 50.—Medical supply depots, CBI theater, 1944.

FIGURE 135.—Native laborers carry and stack medical supplies at the Medical Depot, Calcutta, India.

The medical supply officer at Ledo had not been able to build up his supplies to the authorized 45-day level. Actually, he could not even count on a 10-day level, particularly in class I items. Combat troops were consuming medical supplies at an unexpectedly rapid rate. Besides losing supplies in the airdrop procedure, requisitions submitted by Chinese forces or by the Seagrave unit were not properly screened (fig. 137).

The hospitals in the field had serious supply problems. Shortages of equipment, lack of replacement parts, and scarcity of many drugs and laboratory

FIGURE 136.—C–47 transports lined up on the airstrip at Myitkyina, Burma.

supplies occurred. General dissatisfaction with the medical maintenance unit was common because of its failure to include many drugs used locally in the treatment of disease.

Supply Support for Chinese Troops in India

To add to the already mounting problems in early 1944, British support of the Chinese troops in India was dwindling rapidly. Because of the inability of the British to meet the overwhelming demands for certain critical drugs and chemicals, these items were diverted from Chinese defense supplies and already critically short U.S. Army stocks.

The Chinese defense supplies were not complete, and British Army supplies did not coincide with U.S. standards. The procedure under which field medical units with Chinese troops received Chinese-type medical supplies exclusively, while fixed American hospitals received Chinese-type supplies in proportion to the number of Chinese who would be occupying hospital beds, was criticized by American medical officers who found it difficult to use British medical items, which were of poor quality and scarce in quantity of critical items.

FIGURE 137.—Men in a C–47 shove out supplies to fellow soldiers in the field in Burma, 1944.

A firm recommendation was made by the theater surgeon in March 1944 to abandon the existing system and pool all medical supplies for the Chinese obtained through normal U.S. channels with American stocks in the theater, and issue as required.

Lack of Supplies in Depots

Medical supplies at Chābua were stored in a poor "basha" construction without cement floors; therefore, much deterioration occurred as a result of the climatic conditions. Because supplies were shipped to China in bulk rather than on an items-needed basis, stocks were enormously unbalanced.

At Ledo, lack of personnel and inadequate and widely dispersed warehouses hampered operations. To support the Chinese Army in India, this depot, commanded by Capt. Warren R. Lee, MAC, relied on air supply. After holding conferences with the base surgeon, the base medical supply officer, and the base commander, a new area was secured, with 50 percent more warehouse space and an adequate refrigeration vault for biologicals. Thus, the Ledo depot was changed and refurbished for more systematic operation.

IMPACT OF THE VOORHEES MISSION

Background

With the numerous problems of medical supply mushrooming into crises and no immediate solution available, strong voices of concern emanated from all quarters. At a most opportune time, July 1944, a group of medical supply specialists, under the direction of Col. Tracy S. Voorhees, JAGD, was dispatched from the Surgeon General's Office to the China-Burma-India theater to make a comprehensive survey of the entire supply program.[3] This trip was prompted by specific complaints made by the Air Forces regarding medical supply.

To satisfy the Air Forces, a compilation of its reported needs was included in a special requisition prepared in July to balance incoming stocks. Fortunately, 50 tons of air cargo space to be used for medical supplies from the United States was made available at that time. Heavier items were to come by water, but were given a high priority.

Specific Failures in Medical Supply

Following that action, the Voorhees team conducted a thorough survey of the depots in all base and advance sections of the theater. Four principal causes of the breakdown in supply were identified.

Before 1 January 1944, medical supplies had been received in the theater in the form of medical maintenance units, which consisted of 700 barely minimum items. There was no systematic way to supplement these items and, as a result, theater stocks were generally unbalanced, with some items badly depleted.

Failure to take action to avoid shortages after the automatic system of supply terminated also hurt. The SOS Surgeon and his chief medical supply officer had failed for 90 days to place any substantial requisitions to continue the flow of supplies.

Because of the inadequacy of automatic supply and the failure to file supplementary requisitions by the spring of 1944, there was a general shortage of medical supplies in the theater. No adequate stocks of nonexpendable items existed.

General Depot No. 2, over a long period of time, failed to sort, place in stock, and make available for issue a large quantity of medical supplies which were stored in bulk in a 28,000-sq.-ft. warehouse in the Hoboken section of the depot. Even after the arrival of the 14th Medical Depot Company in early January 1944, the stock was not moved until March. Failure to properly utilize the services of the 14th Medical Depot Company caused this problem.

The mishandling of 80 MMU's in Base Section No. 2 (Calcutta) and Advance Section No. 2 (Chābua) was the fourth identified reason for the

[3] Voorhees, Tracy S.: Visit to the China-Burma-India Theater to Survey Medical Supply, 11 Sept. 1944, together with attachments and inclosures thereto. [Official record.]

supply difficulties of the theater. These units, intended for the Y-Force, were to be moved forward to Chābua at the rate of 20 units per month. The entire 80 units were sent in one shipment without advance notice and with no warehouse space available. As a result, the goods were dumped in a field and were not sorted for 2 months. No proper selection of the items to go forward to the Y-Force could be made and misshipments ensued. Not until June, when a new liaison officer for the Y-Force came to Chābua, was the pile of supplies sorted out and proper shipments made. This whole problem stemmed from lack of coordination between the action of the Y-Force authorities in seeking the shipment and their arrangements for its trip over the Hump. A more clearly defined authority in the Surgeon's Office, SOS, seemed necessary to prohibit the recurrence of this condition.

After authorities visited most of the larger station and general hospitals and studied their needs for extra equipment, requisitions to meet such needs were placed, specifying the most rapid form of shipment available.

Recommendations of the Voorhees Survey

As a result of the Voorhees survey, constructive steps were taken to alleviate the serious problems that existed. Recommendations were made to change the organizational setup in Services of Supply to clarify authority and divide responsibility between the SOS Surgeon's Medical Supply Section and the base sections or advance sections.

By the end of August, 40 tons of medical supplies had reached Calcutta by air, and the flow of supplies to the interior had become continuous as a result of emergency requisitions sent to The Surgeon General by the survey team. It was anticipated that stock would be balanced by October with the assistance of the Voorhees mission. The solving of personnel problems also began. The 14th Medical Depot Company was assigned a more experienced depot commander, and Maj. Arthur Gallagher, MAC, an officer experienced in medical supply stock control, was brought in to establish a centralized system of stock control and requisitioning.

To strengthen the weak depot system, a second medical depot company, the 25th, under the command of Lt. Col. Robert E. Selwyn, MAC, arrived on 27 August 1944 and was assigned to take over the supply operations for all American and Chinese troops in Upper Assam and Burma.

On 1 August 1944, upon recommendation of the medical supply officer, SOS, and the Voorhees mission, the Medical Section of General Depot No. 1 was closed, thus releasing personnel for redistribution. The responsibility for medical supply in the Karāchi-Bombay area was assumed by the 181st General Hospital in Karāchi, which served as a subdepot.

Realinement of Depots

As a result of personnel consolidations, the 69th Medical Depot Company was organized and stationed at Chābua, and the detachments of the 14th Medi-

cal Depot Company at Chābua and K'un-ming were reconsolidated at Calcutta to take on an ever-increasing load of supplies. The 14th, under command of Major Gallagher, was outstanding in its handling of supplies which poured in at a tremendous rate. The limited personnel available often worked around the clock to keep supplies moving during a most critical period. As a consequence, essential supplies were distributed and an adequate medical supply service was made possible sooner than expected (fig. 138; map 50).

IMPROVEMENT OF THE SUPPLY SYSTEM AND ITS PROCEDURES

Personnel Shifts and Changes

During the last half of 1944, it was necessary, as recommended by the Voorhees mission, to obtain better qualified personnel to handle large-scale depot operations and to establish and maintain a sound inventory and stock control system. Medical depot companies had obtained better qualified commanders. Excess officers were absorbed into other medical supply installations, such as those in the larger hospitals. Within the SOS Surgeon's Medical Supply Section, experienced officers were drawn out to serve in field installations, and a smoothly running team of well-qualified officers was brought in to replace them.

Inventory and Stock Record Changes

Stock records at the time of the Voorhees mission were kept in General Depot No. 2 and in SOS Headquarters. As a followup of the survey, the 14th Medical Depot Company was instructed to develop a system of distribution to forward depots based on consumption rates. These data were to be translated into the necessary statistics by the Medical Supply Section in the Surgeon's Office. Before 1944, none of these records had been kept and only limited progress had been made to show the gross needs of the theater and set up a full-fledged inventory control system.

A new system, based on those being used successfully in the United States and in the European theater, was recommended by the Voorhees mission. The first step would eliminate the duplicate set of records in the Surgeon's Office, and assign all requisitioning to an inventory control officer located in a Calcutta branch office. This officer would be solely responsible for the satisfactory operation of the new stock control plan. A stock level was to be set for each item carried in theater stocks. Reorder points were to be calculated on the basis of stock level plus the amount to be issued during a 6-month period. An accurate due-in record would show the current stock status of each item at all times. Monthly review of records would follow for adjustment of stock levels on the basis of actual experience and the picking up of all items which had fallen below the reorder point. Requisitions would be submitted as necessary when indicated by stock records and by due-in record cards.

FIGURE 138.—Distribution of medical supplies. A. Men of the 14th Medical Supply Depot operate a conveyor belt and check supplies as they are made ready for shipment. B. Native laborers unload medical supplies at a subdepot of the 25th Medical Depot in northern Burma.

Together with members of the Voorhees group, the SOS medical supply officer set up initial stock levels for all items needed in the theater, to be reviewed by the inventory control officer, and integrated with depot stock records at Calcutta. A comprehensive requisition was prepared by the inventory control officer for submission in September. Chinese, as well as American, supplies were brought under the system.

As the medical supply situation began to improve, the inventory control officer reviewed stock levels of forward depots in the light of theater levels. The plan was gradually put into effect throughout the medical supply system, and all requisitioning was coordinated and unified.

Changes in the Chinese Supply Program

The Voorhees mission in June had backed up the earlier theater recommendation that supplies for the Chinese Army in India no longer be procured from the British. Unification of procurement and distribution of Chinese supplies through SOS channels was a basic necessity. This action was approved by the War Department in August 1944. With the standardization of procedures, Services of Supply received authority to take over all supplies for all forces in China, except AAF technical equipment and supplies.

Supplies, formerly designated as Y- and Z-Force material, were brought into the stock and inventory control plan at Calcutta and Chābua. By October 1944, Chinese procurement was included in the American medical supply program, thus consolidating theater medical supply requisitions. This meant that there was a single method of procurement, intratheater receiving, storage and issue, stock control, and accounting under Services of Supply.

The reorganization proved to be even more timely and valuable when, on 24 October 1944, the China sector of the CBI theater was constituted as a separate theater with Col. (later Maj. Gen.) George E. Armstrong, MC, as its surgeon (fig. 139). The India-Burma theater became the supply and administrative base for the new China theater.

MAJOR ACCOMPLISHMENTS OF 1944

Improved Organization

At the end of 1944, the whole supply program of the China and India-Burma theaters was working smoothly and efficiently. Critical shortages had been eliminated, both in the depots and in the field. A compact and better functioning supply organization which capably handled requirements for Chinese and American troops in China, Burma, and India had been established. Stock and inventory control procedure had been instituted at all levels of medical supply, thus eliminating many serious imbalances of stock. Automatic supply had been replaced by a process of continuous requisitioning which maintained proper supply levels. Personnel problems were almost entirely eliminated despite the split into two theaters. Transportation, particularly air transport, improved greatly, enabling a much more efficient distribution of supplies.

FIGURE 139.—Col. George E. Armstrong, MC, Surgeon, China theater.

PROGRESS IN 1945

Support for Two Theaters

The year 1945 was placid in the field of medical supply compared to the previous year. Despite the planning for peak operations in anticipation of continued combat in Burma and a combat and logistical program in China climaxing in the final assault on Japan, seizure of the Burma Road early in 1945 and the sudden surrender of Japan in August reduced the medical supply operation progressively and hastened its end.

In carrying out the basic program of providing medical supplies for Chinese and American forces, the first phase of operations was the supply program for the China theater. Emphasis was shifted to an area which heretofore had been only a sector of an entire theater. However, no new burden was imposed on the supply program since the supply of troops in China had already been a part of the overall responsibility of the entire theater. Included in the program had been the supply of the Chinese Y- and Z-Forces, and the Fourteenth Air Force and its subordinate units, as well as a small number of American troops in support of Chinese training and operations. Supplying the Chinese sector had been simplified in late 1944, and every effort was made to

extend to China the same principles of supply management which had been instituted in India and Burma. The fact that the principal consumers were the Chinese Y- and Z-Forces made it impossible to carry out the refinements of the system. Despite efforts to advise and develop in the Chinese military organization the same operational methods which were standardized for American troops, it was impossible to achieve complete uniformity of policy and procedure.

Planning Precedes Changes

To work out details of the China theater supply program, the Surgeon of the China theater, Colonel Armstrong, conferred with the staff of the Surgeon, India-Burma theater, in November 1944. During those conferences, a plan was adopted continuing the system which had developed during the previous months. Maintaining a 90-day level of medical supplies for American and American-sponsored Chinese forces, Services of Supply was to procure, store, and issue all commonly used medical supplies and equipment using the intermediate General Depot, Chābua, as its base. Army Air Forces items, however, were to be obtained by the Air Service Command through the AAF supply depots in India.

By 1 January 1945, initial organizational equipment for the Chinese troops was authorized by the International Aid Division, ASF, in Washington, and stocks for the China theater were divided between Calcutta (90 days), Chābua (45 days), and K'un-ming (45 days). By February, in accordance with the War Department's reduction in supply levels, the level was reduced to 45 days at Calcutta and 30 days at Chābua. The 45-day level was retained at K'un-ming.

Development of the Chinese Supply System

In January 1945, Maj. (later Lt. Col.) James S. Morgan, MAC, was assigned as Medical Supply Officer, China theater. Having two medical supply officers in the China and India-Burma theaters helped to coordinate medical supply activities.

Many of the old procedures were carried over as still being suitable. In the China theater, Services of Supply began to take over all supply organizations which provided service to the Chinese components of the Y- and Z-Forces. Services of Supply became responsible for all the operations necessary to procure material from India for Americans and Chinese in China. During the first few months of 1945, a system of base depots was organized at the entrance to China and at key points in the China theater. The maintenance levels of the India-Burma theater were initially accepted and later revised as experience indicated.

The inability to set levels and stabilize the rate of stockage, issue, and requisitioning prevented an even requisition of supplies from the India-Burma base. Periodically, larger than usual demands for medical supplies in the India-Burma theater necessitated air priority shipment from the United

States. Humps in the flow of medical supplies from the India-Burma theater to China were caused by unexpected changes in operational situations in China, the need to stock adequately newly established depots, and the modification of usage tables based on actual experience. Improvement in the supply program resulted from the mutual exchange of correspondence, roundtable discussions at the Second Medical Supply Conference in May, and the loan of the India-Burma theater inventory control officer to the China theater for a brief period.

End-of-the-War Curtailment

As the end of the war approached, it became necessary to curtail the supply program for the China theater. The India-Burma supply line could be shut off when China's ports were opened for more direct supply to the theater. The supply level for the China theater was reduced to 60 days with medical supplies distributed equally between the Calcutta, Chābua, and China depots. The discontinuance of lend-lease brought no change in the policy of providing maintenance, supplies, and equipment for U.S.-approved Chinese forces. Tonnage allocations for shipment of medical supplies from Chābua to China were canceled for October 1945, and only emergency shipments by air were made thereafter as the bulk of the supplies went over the Stilwell Road or by water from Calcutta. On 31 December 1945, the supply responsibility for China was transferred from the India-Burma theater to the Pacific Area Command.

Disposal of Medical Supplies

With the end of the war, immediate steps were taken to set aside sufficient medical supplies to support the terminal theater activities and to declare excesses and surpluses. Agreements were reached with the Government of India for the disposition of a number of hospitals, and certain other equipment was sold to foreign governments.

By 31 December 1945, great progress had been made in the disposal of supplies:

Tonnage determined excess	long tons	11,887.00
Tonnage shipped to date	long tons	3,074.51
Tonnage declared surplus to F.L.C. (Foreign Liquidation Commission)	long tons	5,209.00
Value of surplus tonnage	dollars	$7,319,093.35
Tonnage disposed of by F.L.C	long tons	843.00
Value of tonnage disposed of by F.L.C	dollars	$1,010,897.45

Because of the considerable labor entailed in disposal activities, both the 25th and the 14th Medical Depot Companies remained in the theater until January 1946.

CHAPTER XVI

Okinawa and the Occupation of Japan and Korea

SUPPLYING THE OKINAWA OPERATION

Preparation for the Assault

Even though the fighting continued in the Philippine Islands until late June 1945, plans were concurrently being formulated for an assault on the Ryukyu Islands which guarded the entrance to the home islands of Japan.

The experience gained in previous Pacific operations helped to augment the tables of organization and equipment of units which would be participating in the assault. A listing of medical units and the authorized equipment, although approved, was not perfect, and it became necessary to request additional equipment. These items often did not arrive on schedule. A critical supply problem developed 2 weeks before the Okinawa operation began, when a ship carrying 48,000 requested jungle kits did not appear at Leyte.

Lt. Col. (later Col.) Stephen G. Asbill, VC, Medical Supply Officer, Base K (Leyte), having no alternative but to provide the necessary kits from the 34th Medical Depot at Tacloban, was caught short by requirements for the landing forces going to Lingayen Gulf ahead of schedule. To cover the deficit, Colonel Asbill arranged for a stock of 70,000 jungle kits to be sent from Hollandia to Leyte on a hospital ship.

To support the early landings on Kerema and Okinawa, the bays of six landing ships were equipped with surgical facilities and were staffed with U.S. Navy surgical teams.[1]

On 27 March 1945, the XXIV Corps, consisting of the 7th and 96th Divisions, and the 77th Division operating separately, left Leyte en route to the Ryukyus. The 77th seized the Kerema Islands group on 30 and 31 March, after which the 7th and 96th, augmented by the 1st and 6th Marine Divisions, assaulted the western shores of Okinawa on 1 April (fig. 140).[2]

Medical Supply Functions

Because of adequate planning and preparation by Maj. Stanley W. Bullis, MAC, Medical Supply Officer, XXIV Corps, sufficient tonnage space and sup-

[1] (1) Action Reports, Ryukyus, Tenth U.S. Army, 26 March–30 June 1945, Vol. 1. (2) Potter, Laurence A.: Preliminary draft manuscript, XXIV Corps. [Official record.]

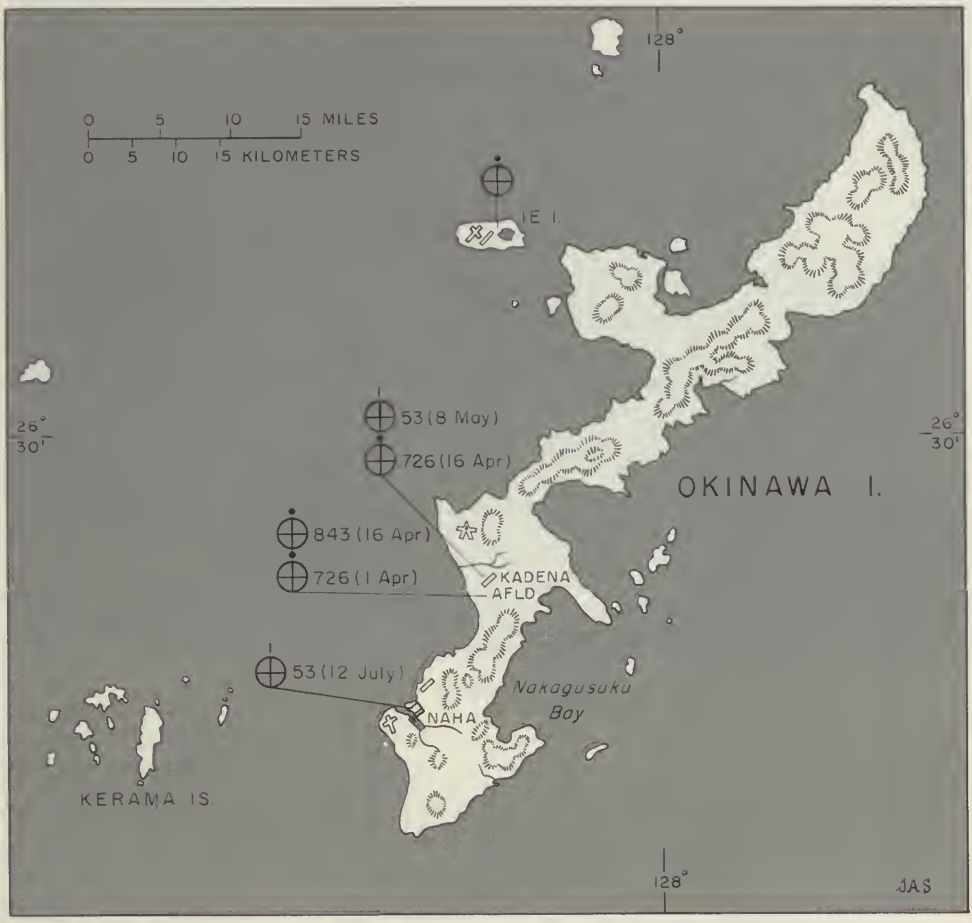
[2] (1) See footnote 1 (1), above. (2) Quarterly Report, Surgeon, 7th Division, 1945. (3) Quarterly Reports, Surgeon, 96th Division, 1945. (4) For further details on the tactical phases of the Okinawa Campaign, see Appleman, Roy E., Burns, James M., Gugeler, Russell A., and Stevens, John: Okinawa: The Last Battle. United States Army in World War II. The War in the Pacific. Washington: U.S. Government Printing Office, 1948, pp. 249–264.

FIGURE 140.—Invasion of Okinawa. Reserve wave of troops heads for the beaches in landing craft, 1 April 1945.

plies from Leyte were made available to support the medical supply aspect of the operation. Four landing ships, medium, assigned to the Corps Surgeon, Col. Laurence A. Potter, MC, were sufficient to move the corps medical battalion and corps medical detachments. Adequate tonnage space for medical supplies was set aside on troop transports and on the cargo ships carrying the hospital elements so necessary for the success of the operation. As a result, selected medical units in the assault were able to carry 30 days of supplies instead of the usual 10.

The 726th Medical Supply Team, which accompanied the assault units on L-day (landing day), took over approximately one-half of each unit's 30-day supply, and added it to scheduled resupply increments made up of medical maintenance blocks which had been loaded in the allotted medical cargo space. These two groups of supplies made up the initial stocks of the corps medical dump on the beach (map 51).

The 726th, with separate supply detachments supporting the 7th and 96th Divisions, remained under XXIV Corps control until 16 April (L+15), when its duties were assumed by the 843d Medical Supply Team. The 726th then set up an Army medical supply dump (fig. 141), in support of the Tenth U.S. Army in its toughest fighting. In the midst of this fighting, the unit was able not only to render effective service, but also to construct enough canvas-covered shelters to protect about 25 percent of its stock.



MAP 51.—Medical supply points on Okinawa, 1945.

When the 53d Medical Depot Company, consisting of 12 officers, 1 warrant officer, and 120 enlisted men, arrived on Okinawa on 8 May (L+38), the unit proceeded to take over the major task of supplying the XXIV Corps from a depot established in the village of Kadena near the airport. Here they remained until 20 July when they moved to Naha, Okinawa, and established a more permanent depot (map 51).

After the 77th Division successfully drove the Japanese from the nearby island of Ie Shima, a medical supply detachment of one warrant officer and three enlisted men went ashore on 17 April and set up a supply dump on one of the landing beaches. This dump served all personnel of the division on the island. This detachment remained on the island with the garrison force keeping the dump in operation to serve the 77th Division troops (map 51).[3]

[3] (1) See footnote 1 (1), p. 531. (2) History, 53d Medical Depot Company, 1944–45. (3) Quarterly Reports, Surgeon, 77th Division, 1945.

FIGURE 141.—Medical supply dump on Okinawa. The shed was constructed by unit personnel during the heaviest fighting.

Hospital Assemblies on Okinawa

Hospital unit assemblies for the Okinawa assault were carefully packed, uniformly marked, and included packing lists which facilitated both loading and unpacking. Each unit of the supporting field hospitals was furnished with one 2½-ton and one ¾-ton truck in which to carry prepacked surgical instruments and supplies that could be made available immediately upon landing. Each hospital unit was stored on a separate vessel to provide proper dispersal.

Typical of the movement of unit assemblies during the Okinawa assault was the experience of the 69th Field Hospital. Personnel and six surgical trucks were unloaded on L+1, and the remainder of its equipment and supplies, which had been carefully packed and crated for the operation, was unloaded during the following 7 days. Having learned much from the Leyte campaign, supply organizations preparing unit assemblies packed plenty of plaster of paris, sheet wadding, and all types of sutures. Some difficulty was encountered in getting equipment off the beaches as sufficient transportation was not available (fig. 142). Other than cots, blankets, and tentage, no other major items of equipment were lost. For the first few weeks, the 69th had a serious shortage of blankets as 300 of the 1,200 blankets packed were lost on the beach and in property exchange. To make up for the lack of pillows, blankets were substituted, and sometimes a shock patient needed as many as six or seven blankets.

To have a reserve of equipment for another hospital in an emergency, an effort was made to keep the equipment of one hospital unit intact.

FIGURE 142.—Transferring cargo to smaller craft for delivery to the beach.

With the exception of plaster of paris bandages and sheet wadding, few other items of supply were scarce.[4]

Followup Supply

Tenth U.S. Army resupply consisted of four different types of medical maintenance units. The Medical Maintenance Unit, Block 1, was designed to supply 3,000 men for 30 days and was landed in the early assault phase. It supplied units providing first- and second-echelon medical service. Fifty of these blocks were originally scheduled to land on L+5, but actually the first ones were unloaded 10 days later, on L+15.

Block 2 consisted of nonexpendable replacement equipment based on SGO (Surgeon General's Office) replacement factors. One block was to be unloaded between L+15 and L+25, but was finally unloaded at L+50. A second Block 2 was scheduled for the eighth resupply.

Block 3, composed of biologicals, supplemented Block 1. Two of these were scheduled for the first resupply, one for the second, and one for the third. However, these blocks landed approximately 10 days later than scheduled.

Block 4, the standard medical maintenance unit—10,000 men for 30 days—

[4] (1) Medical Report, XXIV Corps, Operation ICEBERG. [Official record.] (2) Action Report, XXIV Corps, Ryukyus, Preliminary Planning, April–June 1945. (3) Semiannual Reports, 69th Field Hospital, 1945. (4) See footnote 1 (2), p. 531.

was not unloaded until the fourth resupply and occurred 10 days later than scheduled. Each resupply subsequent to the fourth for the remainder of the automatic resupply period of 210 days contained eight or more Block 4's, depending on troop strength ashore. By L+180, a sufficient number of these blocks were ordered to build up a 90-day reserve stock.[5]

Blood Supply

Specially equipped LST's (landing ships, tank) acted as floating depots for whole blood, thus assuring timely and adequate delivery.

Ashore, a blood bank was operated by a blood bank detachment under the supervision of the medical supply officer, XXIV Corps. Blood was available as far forward as the collecting stations which supported the infantry regiments. Because of the availability of whole blood in the 7th Division Clearing Station, a soldier who lost portions of all four of his limbs when his vehicle was struck by a landmine was saved.[6]

Analysis of Supply Operations

Although no critical shortage of medical supplies occurred on Okinawa for any extended period, a number of shortages arose because of increased consumption and inability to unload supplies selectively. When a critical situation seemed imminent, air shipments were used with timely results. Interchange of supplies between Army and Marine supply dumps also helped. Excessive administrative delay did occur, but this was minimized by aggressive action on the part of the medical supply officer.

The general success of medical supply on Okinawa was remarkable, considering that the American casualties on Okinawa were the highest of any Pacific campaign. Also, a significant amount of medical care was rendered to the natives.

Even before the fighting ended on Okinawa, the XXIV Corps was planning for its assignment in the assault on Japan. The corps was busily reequipping and retraining when the war ended. Okinawa was the last ground campaign of World War II.[7]

PLANNING THE ASSAULT ON JAPAN

Development of Strategy

By June 1945, the recapture of Luzon, the last important large island objective, was assured, and the way to Tokyo had been opened by seizing Okinawa and its neighbor islands.

Gen. Douglas MacArthur, designated Commander in Chief, U.S. Army Forces in the Pacific, in April 1945, was given the responsibility of preparing the final operations against Japan.

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[5] See footnote 1 (1), p. 531.
[6] See footnote 1 (2), p. 531.
[7] (1) See footnote 1 (1), p. 531. (2) Quarterly Report, Surgeon, XXIV Corps, 3d quarter, 1945.

Under the code name, Operation OLYMPIC, an invasion of southern Kyushu Island by the Sixth U.S. Army was to begin on 1 November 1945; and 4 months later, Operation CORONET, an assault on the main island of Honshu by the Eighth U.S. Army from the Philippine Islands, the Tenth U.S. Army from Okinawa, and three Marine divisions, was to be followed by the redeployment of the First U.S. Army from Europe.

Early in the spring of 1945, planning began for the occupation of Japan and Korea, control of the Armed Forces and civilian population, and enforcement of the prescribed terms of surrender. It was assumed that Japan might request a cessation of hostilities early in the invasion operations.[8]

Medical Supply Planning

Medical supply planning for the invasion of Japan began in April 1945, under the direction of Lt. Col. (later Col.) Ryle A. Radke, MC, Surgeon's Office, General Headquarters, Manila, a recent arrival from the Mediterranean by way of Washington.

Two factors complicated planning for medical supply: The prospect of field service in a colder climate and the desire to improve the service of medical units by adding certain items of equipment which had been proved invaluable. After careful study, lists of additional equipment were prepared, submitted, and approved as special changes to supplement the War Department tables of organization and equipment. Complete reequipment of all units on the troop list was initiated.

To insure delivery of adequate supplies to the invasion beaches early in the operation, all units were required to carry supplies for 30 days. An additional balanced stock of 15 days was carried in division dumps and by separate medical supply units. Stocks were held in reserve on Okinawa and at Manila to be drawn upon for emergency airdrops or for movement to any beachhead by water. Balanced stocks were loaded on ships to be used for later resupply.

An adequate supply of whole blood on the beaches of Japan was to be guaranteed by providing a mobile refrigerator holding 200 pints of blood for each corps to be landed on D-day. In addition, each field and evacuation hospital was instructed to carry an initial stock of 100 pints of blood. For fast resupply, the Navy was to provide four mobile distribution units on LST's which would accompany the assault echelons. Further supply of blood was to be airshipped daily from the Navy whole-blood distribution center on Guam.

Medical supply plans were based largely on previous operations, especially Leyte and Luzon. Although the medical maintenance unit would provide essentials during combat, many sorely needed items had been omitted. Using block-loaded ships from the Zone of Interior and new medical maintenance

[8] (1) Medical Supply Plan, Operation OLYMPIC. [Official record.] (2) Basic Outline Plan for Operation BLACKLIST to occupy Japan and Korea. [Official record.]

units based on theater experience and consumption studies made by the Supply Division, medical supply blocks were designed.

Medical Supply Block 1 was designed to supply 25,000 men for 30 days during combat operations. Block 2 consisted of 6,800 items, including spare parts and optical supplies, and was computed on the basis of War Department table of organization replacement factors. Block 2 was designed to supply 100,000 men for 30 days for fixed-hospital maintenance, and to provide a balanced stock which would permit organizations to requisition items either lost or damaged in combat. These requisitions were submitted by the Medical Supply Division, Office of the Surgeon, U.S. Army Services of Supply, to the Zone of Interior in May 1945.

Medical supplies for Operation OLYMPIC were to be moved into the target areas in three blocks loaded on standard cargo ships. Twenty-eight ships, coded as BOOM, were to carry Block 1 medical supplies. Thirty-five ships, coded as CROW, were to carry Block 2 supplies. Resupply ships were coded as PLUM, with each vessel scheduled to carry supplies for 40,000 men for 30 days. Because of Japan's early surrender, these plans were never put to a test. However, after careful evaluation of the supply plan for OLYMPIC, the Stock Control Division, SGO, found that Block 2 greatly exceeded any known or anticipated requirements, while Block 1 was reasonable and realistic. Revisions and recommendations of the Stock Control Division were accepted by the theater. The quantities of approximately half of the items in Block 2 were revised, with 70 percent of the revisions being downward. Theoretically, these supplies were to cover Operations OLYMPIC and CORONET until the theater could be established on a requisitioning basis. The theater was to requisition for the blocks desired on a prearranged plan. Of the original 35 for Block 2, 16 were canceled, leaving a balance of 19.[9]

Support for Operations in Japan

Logistical support for operations against the Japanese home islands were to be carried out by Base X (Manila), Base M (San Fernando), Base R (Batangas), Base K (Leyte), and Base S (Cebu). The major reserve of medical supplies and equipment was to be held at Base X (map 52).

By August 1945, Base K was handling only from 25 to 30 percent of the theater supplies while Base X was handling 40 to 50 percent. Estimated medical depot storage requirements for each base were computed in June 1945, based on 17 pounds of medical supplies per square foot. Calculations for storage included some space for unit assemblies as well as for bulk stocks. Base X was the largest depot, 630,000 square feet of hardstand and 365,000 square feet of covered storage; Base S was the smallest, with 110,000 square feet closed and 50,000 feet open.[10]

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[9] (1) Semiannual Reports, U.S. Army Forces, Western Pacific, 1945. (2) Owens, J. L.: Preliminary draft manuscript, Closing Months of the War Against Japan. [Official record.] (3) Quarterly Reports, Sixth U.S. Army, 1945. (4) See footnote 8 (1), p. 537.

[10] See footnote 9 (1), above.

Map 52.—Bases supporting operations in Japan, 1945.

Redeployment of Medical Supply Units

After the successful conclusion of the war in Europe on 8 May 1945, the tempo of the Pacific war increased. Staging of redeployed units in the Philippines was planned at newly expanded bases. Over 50,000 hospital beds were programed for the Philippines. Thus, various types of hospital assemblies and other unit supplies for these redeployed units were received and stored in dispersed locations. Earlier lack of sound packing, crating, and documentation of supplies was resolved in later shipments.[11]

Plans were made in early 1945 for the redeployment of eight medical depot companies from the European Theater of Operations, U.S. Army.

REORGANIZATION OF THE MEDICAL SUPPLY SYSTEM

Organization and Change

U.S. Army Forces, Pacific, which supplanted and absorbed U.S. Army Forces in the Far East in April 1945, was without a medical supply division until 21 August, after the war was over. Before that date, policy direction at headquarters on supply matters was exercised by Col. Paul I. Robinson, MC, deputy to Brig. Gen. (later Maj. Gen.) Guy B. Denit, the Theater Surgeon.

During the period of island-to-island warfare, the Theater Surgeon's Office had been limited in size to meet the requirements of a mobile and flexible organization and to better coordinate supervision of medical components of the various echelons. On 7 June 1945, a logistical command, AFWESPAC (Army Forces, Western Pacific), was organized and thereafter assumed all supply responsibilities in the Pacific. The new command, which replaced the older Services of Supply organization, was also responsible for supplying the Sixth and the Eighth U.S. Armies, and the U.S. Far East Air Forces.

The medical supply units in the Pacific were widely dispersed and were staffed by veterans of the Pacific campaigns who were long overdue for rotation to the United States. A few keymen were retained in the theater, but, overall, experienced medical supply personnel were in critical demand during the last months of 1945. When plans were being made for Operations OLYMPIC and CORONET, it had been obvious that staff personnel would have to be provided from existing Pacific supply depots which were already understaffed. To prevent loss of key depot personnel through misassignment, liaison was established with replacement depots.

The establishment of Army Forces, Western Pacific, did nothing to enlarge the Medical Supply Division, which was already inadequate for its growing responsibilities. The 17th Medical Supply Depot on New Caledonia continued to provide the manpower for the theater stock control mission as

[11] (1) See footnote 9 (1), p. 538. (2) Memorandum, Capt. Charles C. Clark, AGD, Asst. to the Adjutant General, Hqs., USAFWESPAC, for the Commanding General, Sixth U.S. Army, 31 July 1945, subject: Packing and Crating. (3) Quarterly Report, Surgeon, Philippine Base Section, April-June 1945.

a component of the Technical Services. Under the direction of Maj. (later Lt. Col.) John W. Fieting, MAC, effective stock control practices were established which had been tested and proved in the Zone of Interior. A theater stock control applicable to all technical services was developed later by Major Fieting while he was on loan to G–4 (Assistant Chief of Staff, G–4 Logistics) Section, AFWESPAC.[12]

Stock Control

The computation and recomputation of statistics and reports by manual means was a trying task, alleviated only when electric accounting machines were installed in the Stock Control Division of the Theater Surgeon's Office. These machines proved invaluable in determining theater levels upon which to base surplus property disposal actions.

The study of replacement factors on selected items, begun in November 1944, was continued. On the basis of this experience, revised factors were submitted to the San Francisco, Calif., Port of Embarkation for approval. Used thereafter in computing requisitioning factors, a definite improvement in theater stock levels was brought about.

By mid-1945, the limited transportation facilities from New Guinea had improved. Shipments of stocks were made to the Philippines, thus reducing the necessity for requisitioning on the United States, except for future operational requirements.

Col. John A. Worrell, MC, formerly commanding officer of the Toledo Medical Depot, was sent on a tour of New Guinea bases in May 1945 to insure that priority items were shipped from New Guinea according to need, and that approved packing, crating, and documentation practices were being followed. The job of moving material forward accomplished by the depots was commendable despite limited facilities and materials. The packing and crating job, however, was done by hospital personnel and was far from adequate. To avoid resupplying and reequipping hospital units moving forward, depot personnel supervised and assisted in packing and crating.

By June 1945, with the stabilization of military operations, it became advisable to place Army supply points on a requisitioning basis. This policy curtailed many of the shortages and excesses at the consuming level which had resulted under the automatic supply procedure.

Establishment of the Depot Operations Branch

In the summer of 1945, the Depot Operations Branch was established in the Medical Supply Division, with the mission of preparing plans and policies for the storage and issue of medical supplies and equipment; computing storage requirements; allocating personnel; and inspecting packing, crating, and marking methods, and depot stock control and inventory procedures. By

[12] (1) Annual Report, Surgeon, U.S. Army Forces, Pacific, 1945. (2) See footnotes 9 (1) and 9 (2), p. 538.

September 1945, an inspection team was sent out from the branch to check the accuracy of current stock status reports. This team was invaluable in improving the overall efficiency and economy of the supply service within the Western Pacific theater.

An Equipment, Maintenance, and Repair Section was also established within the Depot Operations Branch during the period. There had been considerable deterioration of combat equipment, and although emphasis was placed on the importance of first- and second-echelon maintenance, numerous items of unserviceable equipment needed care because spare parts were not available. To alleviate this problem, Base X was designated as the key depot for storage of spare parts and of replacement parts which were rapidly supplied by air. Bases K and X were designated as the central fourth- and fifth-echelon repair shops, which made possible the successful completion of the rehabilitation and reequipment program for projected operations. The subsequent conversion from combat to occupation needs under Operation BLACKLIST and the readjustment of personnel to the United States made the shortage of trained maintenance personnel even more critical.[13]

PHILIPPINE ISLANDS BASE SECTIONS

Organizational Changes and Problems

All Philippine Islands bases encountered the same general problems in establishing and operating their respective medical supply systems. Poor storage facilities and insufficient depot personnel were common. Indigenous personnel were not suitable for stock control and stock selection. Depots had to borrow personnel from neighboring medical units to operate around the clock at peak efficiency during the periods of receiving supplies and outfitting units for Operation BLACKLIST. At the same time, large quantities of stocks were being received, exceeding assigned storage space and forcing relocation. In the early days of 1945, replacement supplies were mainly medical maintenance units, but they were gradually replaced by line-item requisitions to balance stocks. When shipments from the United States arrived before the receipt of shipping documents, tallying-in of the incoming property was delayed. This was particularly irritating as stocks had to be stored according to ships' deliveries pending receipt of the shipping documents.

Refrigeration was also a problem, and improvisation or reliance on other sources for refrigerator space were the common alternatives in most bases.

As of 1 July 1945, strict accountability was placed in effect within the Philippines, necessitating the initiation of prescribed inventory and accounting procedures. The large exodus of units in August under Operation BLACKLIST required the preparation and issue of substantial amounts of equipment and replacement supplies. As strengths in the bases receded, hospitals and other medical units began turning in their excess supplies, equipment, and unit

[13] See footnote 9 (1), p. 538.

assemblies to the depots, which were caught in a squeeze between the increased workload and the postwar personnel reductions.[14]

Manila Base Depot Systems

By August 1945, the Greater Manila area contained one of the largest medical depot systems developed in the Pacific area during the war. As part of the base development plan, 365,000 square feet of covered storage and 635,000 square feet of hardstand for medical supplies and equipment was being constructed in five separate areas during June, July, and August.

From the time that Manila was occupied until the assumption of logistical support by Base X, the medical depot, located in a Manila schoolhouse, was operated by the 15th Medical Supply Platoon (Aviation), a Sixth U.S. Army unit. When the 49th Medical Depot Company arrived in Manila, it took over the issue point from the 15th which returned to combat duties.

With the increase of receiving and shipping activities, additional storage facilities of a variety of conditions and locations were allocated as well as desirable hardstand located at the North Harbor Beach area and the South Beach area of Manila. DUKW's (amphibious trucks, 2½-ton cargo) were used to haul supplies from the ships backlogged in Manila Bay, to the supply storage areas faster than the depot crews could tally in and stock them (fig. 143). Fortunately, the use of abundant civilian labor and the dry season facilitated this operation. In the meantime, a former Philippines customs warehouse in the port area replaced the schoolhouse. This new warehouse, with 90,000 square feet of covered space, became the nucleus for local storage and issue, relieving added storage problems which had stemmed from the poor packaging of material shipped from New Guinea bases.

As soon as pierside unloading was available, the North Harbor Beach dump was reduced to use as dead storage space for bulky, slow-moving items. Additional bulk-storage space was acquired on North Bay Boulevard; however, lack of materials for handling equipment hampered operations.

During June 1945, the depot was expanded by constructing a 26,000-sq.-ft. prefabricated warehouse adjacent to the issue depot, and six warehouses, totaling 200,000 square feet, at Quezon City (fig. 144). Adjacent to the Quezon City warehouses was 104,000 square feet of hardstand, and an additional 140,000 square feet of hardstand was acquired when one-half of the Zablan airstrip was taken over. The widely scattered locations of warehouse and storage areas presented problems which would not have been encountered if the depot had all been under one roof (map 53).

Depot Operations

All issues were made from an issue warehouse where the master locator and stock records systems were maintained. Paperwork in the outlying agencies was kept to a minimum to control and expedite movement of stocks.

[14] See footnote 9 (2), p. 538.

FIGURE 143.—General view of docking and incoming ships at Base X port area, Manila, September 1945.

A medical supply liaison section of the depot directed delivery of medical supplies from the ships to the proper dump or to the warehouse furnishing the depot with advance notice of supplies to be received. A locator service on stray medical shipments was also maintained by the medical supply liaison section.

Additional personnel from various other medical depot companies were used by the 49th because its own were insufficiently trained. Soon the policy was established to have the outlying area units operated by separate detachments. The depot system of Manila was utilized to train new units on their arrival in the theater. To permit the administrative operation of these many groups, the 5261st Medical Depot Group (Provisional) was organized. This resulted in more effective administrative control of the numerous depot companies which were operating the medical depots and assured a continuity of effort in supporting the numerous hospitals and equipping the units mounting for Japan.

As of 15 October 1945, the issue depot was operated by the 49th Medical Depot Company; the bulk-storage warehouse in the Quezon City area was

FIGURE 144.—Receiving section and warehouse, 49th Medical Depot Company, Quezon City (near Manila).

operated by a detachment of the 61st Medical Depot Company; the South Beach dump, Depot No. 4, was operated by the 67th Medical Depot Company; and the Zablan Bulk Storage Depot, Depot No. 6, was run by the 48th Medical Depot Company which had been redeployed from Germany (map 53).

Until the responsibility reverted to the Philippines Commonwealth Government, medical supplies for civilian relief of the Philippine Islands were received, stored, and issued by the 77th Medical Base Depot Company which used the 36,000-sq.-ft. Studebaker automobile distributing agency building.

Map 53.—Manila base depot system, 1945.

The tonnage received and shipped by the medical supply depots in Manila from the beginning of operation is given in table 8.

TABLE 8.—*Tonnage: Medical supply depots in Manila, April-September 1945*

Month	Received (*measurement tons*)	Shipped (*measurement tons*)	Month	Received (*measurement tons*)	Shipped (*measurement tons*)
April	9, 000		July	11, 600	675
May	14, 000	221	August	8, 372	462
June	9, 000	360	September	7, 565	290

Amounts of supplies shipped do not include the innumerable issues to organizations drawing their supplies locally. While the first 3 months of operation consisted of receipt, storage, and routine issue, June, July, and August found the depots with the additional load of reequipping units for a forthcoming operation.

Following V–J Day, additional problems emerged, such as receipt, reconditioning, and storage of equipment being turned in by inactivating organizations; supply of occupation forces by shipments from Base X and other bases; and determination and disposal of excesses.

Maintenance and Repair

To meet the need for repair, a maintenance section of the 49th Medical Depot Company was established in the issue depot (fig. 145). At the beginning of its operation, repairs had to be accomplished by cannibalization of items because of an inadequate stock of spare parts. Fortunately, the workload was light until redeployed units began to arrive in the area. Consequently, maintenance sections of the other depot companies were combined to pool their supplies, equipment, and personnel, and Manila was designated the key depot for spare parts. While spare parts continued to arrive automatically, many parts could not be used because they were of a different manufacture than the end-item for which they were required.

Optical Service of Manila Depots

The optical service in Manila began with the operation of the optical section shop, run by the 49th Medical Depot Company (fig. 146). Although the workload was light, difficulty was encountered because of the lack of lenses and of spectacle repair parts, a situation resulting from the procedure established by the Surgeon General's Office. This procedure required that requisitions for lenses and spectacle repair parts be placed for direct delivery to each individual optical unit. Because of the distances between ports and the shipping backlog, optical units were often short of various supplies. The shortage of stock during the early stages of operation was partly overcome by requisi-

FIGURE 145.—Maintenance Section Shop, 49th Medical Depot Company.

tioning repair supplies from portable optical repair units. To prevent continuation of such shortages, a key depot, responsible for establishment of theater levels of optical supplies, and for requisition, storage, and issue to various optical units, was established in Manila. Because of the minimal weight of spectacle repair parts, unit stocks were easily restored by either mail or air shipments. As additional medical depot companies arrived in Manila, their optical repair sections, set up in the issue depot, pooled equipment, supplies, and personnel.

Whole-Blood Distribution

One important aspect of the medical depot was the supply of whole blood to units in the Manila area. The first issue was made on 11 March 1945 by the 15th Medical Supply Platoon (Aviation). There was an average daily issue of 125 pints during March, 160 to 175 pints during April, and 175 pints during the succeeding 3 months. With the cessation of hostilities, the issue of blood dropped to a minimum. Shipments of whole blood from the United States ceased on 15 September 1945.[15]

[15] (1) See footnote 9(1), p. 538. (2) Essential Technical Medical Data, U.S. Army Forces in the Pacific for September 1945.

FIGURE 146.—Optical Section Shop, 49th Medical Depot Company.

Airdrops to American Prisoners of War

On 4 July 1945, in anticipation of the collapse of Japan, plans were made to airdrop essential medical supplies to all American prisoner-of-war camps in Japan and Korea. The Surgeon's Office, AFWESPAC, developed a list of components, and the depot supply service experimented with and developed suitable packaging (fig. 147 A). The project involved 180 drops, each of which contained 42 essential items including concentrated vitamin products, antimalarial drugs, parenteral dextrose solutions, diarrheal remedies, analgesics, and narcotics. The package, limited to 125 pounds, was required to fit into a canvas drop package 14 inches in diameter and 6 feet long. The drops were made on each prisoner-of-war camp together with appropriate medical personnel shortly after V–J Day (fig. 147 B). Because the liberated American prisoners were evacuated so rapidly, the drops were not so beneficial as had been anticipated.[16]

OCCUPATION OF JAPAN

Operation BLACKLIST Executed

With the sudden and unexpected surrender in August 1945, the block resupply set up for Operations OLYMPIC and CORONET was no longer

[16] See footnote 9(2), p. 538.

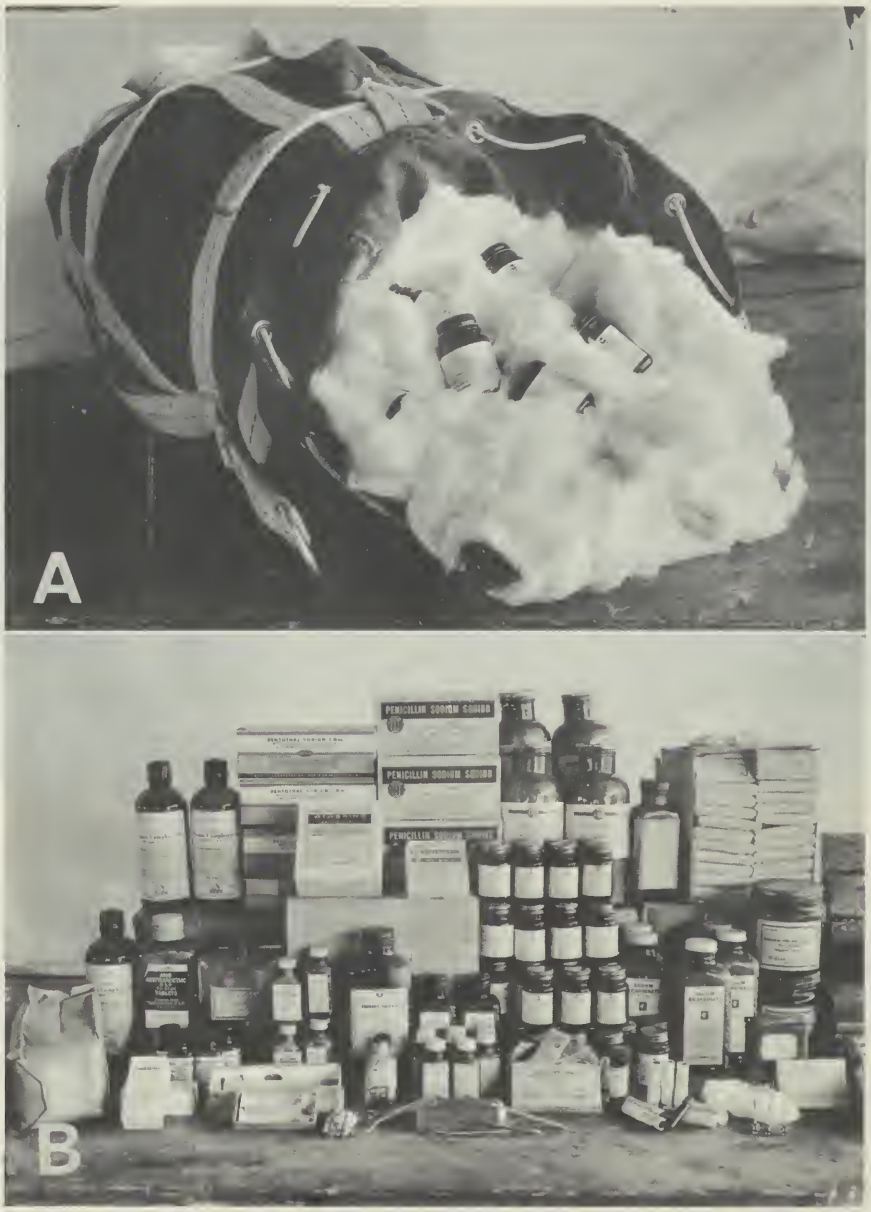

FIGURE 147.—A. Parachute airdrop pack opened to show how each item was wrapped in cotton. B. Medical supplies that constituted an airdrop package for American prisoner-of-war camps in Japan and Korea.

FIGURE 148.—St. Luke's International Hospital, Tokyo, Japan, operated by the 42d General Hospital, 12 October 1945.

needed. Operation OLYMPIC was hastily converted to Operation BLACKLIST, which provided that occupation units would carry medical supplies for 30 days.

In numerous supply conferences held between Colonel Robinson, of AFPAC (United States Army Forces in the Pacific), and the medical supply officers of key bases and armies, it was decided that resupply would be provided by the block-loaded ship. Army Forces, Western Pacific, hastily developed an automatic resupply block consisting of 2,680 items based upon ZI (Zone of Interior) replacement factors for 100,000 men for 30 days. A 500-bed hospital assembly was shipped to Yokohama as an emergency source of equipment and for other unpredictable needs. Upon arrival, this assembly was diverted for utilization by the 42d General Hospital, which was established at St. Luke's International Hospital, Tokyo (fig. 148). An unplanned and welcome source of supplies came from the U.S. Army Hospital Ship *Marigold*, without the knowledge or requisition of the theater. Apparently, requisitions had been placed in the Zone of Interior by the Surgeon General's Office and loaded out of San Francisco.

By 27 September 1945, 30 days' supply for 100,000 men was stored in the Yokohama Depot which was operated by the 29th Medical Depot Company. Tremendous quantities of litters, blood plasma, plaster of paris bandages, and similar bulky combat type items arriving in block-loaded ships from the Zone of Interior became a disposition problem. When the 43d Infantry Division

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and the 1st Cavalry Division departed for the United States, they complicated depot operations further by turning in field equipment.[17]

Problems of Supply in Japan

Despite the haste with which occupation plans were formulated and executed, medical supply problems were initially minor.

Winter items, such as pajamas and convalescent suits, not required in either New Guinea or the Philippines, were in short supply as the block-loaded ships provided quantities based on replacement factors only. The shortage of temperate-zone items required the supply by emergency requisitions from the United States.[18]

Avoiding Excesses

Considerable pressure was placed on all supply echelons to prevent the buildup of excesses in Japan.

All OLYMPIC requisitions which had not been shipped from the Zone of Interior before Japan surrendered were immediately canceled. It was recommended to the War Department that fully loaded ships awaiting discharge in Japanese waters be returned to the States unless they were carrying essential equipment and supplies required in the occupation area. As this complicated supply computation, it was requested that emergency requisitions be submitted to the Philippines for any supplies not received because of ship diversion.

Beginning on 1 October 1945, replacement factors were computed on ZI rates upon instructions from U.S. Army Forces in the Pacific. Numerous ship diversions occurred from the Philippines to Japan, with many ships containing hospital assemblies from the European and Mediterranean theaters of operation. If these assemblies were delivered to the Philippines, they were unloaded; if received in Japan, they were returned to the United States.[19]

Postwar Supply System

By 1 January 1946, the medical supply system in Japan was well established. Col. Stephen G. Asbill, VC, was Chief, Medical Supply Division, U.S. Army Service Command, with Capt. Albert Simms, MAC, serving as chief of the Administrative Division. The stock control mission was performed by a separate unit headed by Maj. Cornelius J. Curran, MAC, and was attached to the 29th Medical Depot at Yokohama, the key depot in Japan. The 9th Medical Depot Company, commanded by 1st Lt. Milton A. Kaplan, MAC, arrived at Wakayama (Southern Honshu Island), on 29 September 1945, from Base

[17] (1) Logistics Instructions for the BLACKLIST Operations, Hqs., U.S. Army Forces, Western Pacific, 15 Aug. 1945. [Official record.] (2) Minutes of Agencies interested in BLACKLIST, 17 Aug. 1945. [Official record.] (3) Annual Report, Planning Division, Office of the Chief Surgeon, AFPAC, 28 Mar. 1945. (4) Quarterly Report, 42d General Hospital, July-September 1945. (5) Quarterly Reports, 29th Medical Depot Company, 1945.

[18] See footnote 9(2), p. 538.

[19] See footnotes 9 (1) and 9(2), p. 538.

Map 54.—Postwar medical supply system in Japan and Korea, 29 September 1945.

M. It was initially assigned to Headquarters, Sixth U.S. Army, and later to I Corps, and it operated depots at Nagoya, Wakayama, and Kōbe (map 54).

The 78th Medical Base Depot Company, commanded by Capt. (later Maj.) Leroy M. Martine, MAC, arrived at Otaru, Hokkaido, on 5 October 1945, with 180 measurement tons of medical maintenance units to supply 20,000 troops in that area. This unit experienced difficulty in protecting its supplies from the freezing temperatures of that location. An improvised structure of approximately 10,500 cubic feet was built from framing and tarpaulins and was heated with gasoline tent stoves.

On 20 October 1945, the 80th Medical Base Depot Company, commanded by Capt. F. R. Glascock, MAC, arrived in Yokohama and was attached to the 29th Medical Depot Company.

During October 1945, the Medical Supply Division, AFWESPAC, requested inventories from the various command levels to establish accurate theater on-hand figures. At the same time, medical supply procedures were furnished these commands, since AFWESPAC was to provide logistical support until 1 March 1946, when the Eighth U.S. Army was scheduled to assume responsibility.[20]

MEDICAL SUPPLY OPERATIONS IN KOREA

Organization

Japan's sudden surrender found the staff of the XXIV Corps still planning for the invasion of Japan. The corps was furnished with medical support units necessary to perform its independent operation as an occupation force in Korea, and was designed to support a force of 100,000 men and a military government organization. An initial mission of the corps was recovery, processing, initial care, and evacuation of U.S. prisoners of the Japanese in mainland prison camps.

Medical Supply Responsibilities

Responsibilities of the medical supply officer, XXIV Corps, ranged from supervising medical-supply manufacturing installations which Japan had established in Korea to reestablishing production in a variety of factories in Korea.

Another peculiarity of the supply program was the arrival of assigned hospital units less all personnel except one lieutenant and one corporal. These units were completely equipped, but because of the rotation policies, they had lost all personnel at their points of origin, either in Okinawa, Tinian, or Luzon, or back in Australia or Hawaii. Soon a mountain of unprocessed supplies, equipment assemblages, and paper piled up beside the inadequately staffed 58th Medical Base Depot Company. It was not surprising that it took many months to work out this backlog. Unmanned units were never manned because the planned strength of the occupation force was reduced to 40,000, and so the disparity between supplies and personnel continued to grow.[21]

Rehabilitation Activities

Medical supply personnel were called upon to make significant contributions to the medical service in Korea by a number of activities. They outfitted and put into service a hospital train, established supply stores in Korean hospitals, reestablished medical schools, and set up a previously dismantled smallpox vaccine manufacturing laboratory and distributed its product to the civilian population, thereby combating a full-scale epidemic.

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[20] (1) See footnotes 9(1) and 9(2), p. 538; and (5), p. 536. (2) Quarterly Report, 9th Medical Depot Company, July-September 1945. (3) Quarterly Report, 78th Medical Base Depot Company, October-December 1945.

[21] (1) Quarterly Report, Surgeon, XXIV Corps, October-December 1945. (2) Quarterly Reports, 58th Medical Base Depot Company, 1945.

The medical supply system was also instrumental in establishing standards for drug purity by promulgating codes of conduct for the drug manufacturing industry.

Early in October, a classical smallpox epidemic began to crop up in the civilian population which had not been vaccinated for 5 years, as the vaccine laboratory near Taegu had been diverted to meet the needs of the Japanese Forces. Through the efforts of Capt. Ernest R. Tinkham, MAC, the laboratory at Seoul was reestablished, and vaccine became available.

In early November, with the recognition of the first U.S. case of smallpox and a serious outbreak of smallpox among civilians, all personnel of the command were ordered revaccinated. A new consignment of vaccine was obtained from Philippine Islands laboratories. Because some cases of smallpox among U.S. personnel remained in evidence, the medical supply officer required high-potency vaccine to be airshipped from California. All members of the command were given this vaccine. From then on, all personnel arriving in Korea were vaccinated aboard ship before debarking.[22]

CIVILIAN AID

Civilian Medical Supply in the Philippines

Supplies for Philippine Islands civil affairs units were received, stored, and distributed by Army medical supply personnel. Relief stocks were distributed proportionately under the operational control of the Sixth and Eighth U.S. Armies. On 1 July 1945, full responsibility for civil affairs supply was transferred to the Eighth U.S. Army to release the Sixth for future operations. The Eighth was responsible for maintaining necessary records to insure that supplies were not over-requisitioned. Issues from Army stocks were made in emergency only if Army stocks were in a favorable position.

With the cessation of hostilities, the supplies for Philippine Islands civil affairs units, which were stored in civil affairs medical depots in Manila and Leyte (fig. 149), were inventoried to determine supplies ready for issue to the civilians of Japan and the Philippines. These supplies were transferred to the Foreign Economic Administration, which turned them over to the Commonwealth of the Philippines Government on 9 October 1945, thus releasing the Army from further responsibility for civilian supply in the Philippines.[23]

Civil Affairs Supplies in Japan

Late in August 1945, plans for the supply of the civilian population of Japan were begun by Col. (later Brig. Gen.) Crawford F. Sams, MC, surgeon of the Japanese Allied Military Government group and his medical supply staff, in coordination with the AFWESPAC Medical Supply Division. Colo-

[22] (1) Essential Technical Medical Data, XXIV Corps, for November 1945. (2) Essential Technical Medical Data, XXIV Corps, for December 1945. (3) For further details on the smallpox epidemic in Korea, see Medical Department, United States Army. Preventive Medicine in World War II. Volume IV. Communicable Diseases. Washington : U.S. Government Printing Office, 1958, pp. 156–161.

[23] See footnote 9(1), p. 538.

FIGURE 149.—Civilian relief supplies at Tacloban, Leyte Island.

nel Sam's group took the position that, because the war was over, civilian requirements should be given priority over military requirements. The Supply Division, on the other hand, believed that, because medical supplies in the theater were Army stocks, only excesses could be applied to civilian requirements and then only after SGO approval. Failure to establish delineation of responsibility between the Allied Military Government and the Eighth U.S. Army was another confusing factor. Since neither group had sufficient personnel, the task fell on the 29th Medical Depot Company at Yokohama.

On 22 September, a medical maintenance unit was shipped to the Hiroshima area, along with as much penicillin and other essentials as could be spared. In response to a request of the Eighth U.S. Army, a full medical depot company was provided to operate the Civilian Aid Program for the Allied Military Government group. Late in September, the SS *Tuscon* was diverted from the Philippines to Japan. Eleven hundred cases of supplies and a large quantity of relief supplies for the Philippines were segregated in 35,000 square feet of covered storage by the 29th Medical Depot Company. At a later date, Japanese Army stocks were diverted for civilian requirements, and a program to build civil affairs units from excess U.S. Army stocks was started by Army Forces, Western Pacific.[24]

DISPOSAL OF EXCESSES AND SURPLUS PROPERTY

Organization and Early Work

After V–J Day, advantageous disposition of the huge excesses of medical supplies and equipment became one of the prime missions of the Army Forces, Western Pacific. Early in September 1945, Maj. Raymond F. Linn, MAC, was

[24] See footnote 9 (2), p. 538.

designated as the medical member of an AFWESPAC surplus property disposal team which visited New Guinea bases with the objective of delivering all supplies in excess of a 6-month maintenance requirement to the Dutch Government. After inventorying and pricing stocks at these bases, the value was set at $4.8 million.

On 25 October 1945, disposition of surplus property was assigned the highest priority by G–4, AFWESPAC. Despite clearly refined relationships between G–4, G–5 (Assistant Chief of Staff, G–5, Civil Affairs), Technical Services, and the Office of the Foreign Liquidation Commission, disposition of surpluses was hampered by the computation of requirements for a War Reserve Stock to be maintained in the Philippines. However, by 2 November, declarations of surpluses had been initiated.[25]

Closeout of Philippine Islands Bases

Closeout of the Philippine Islands bases came next in the rollup of the rear. The 34th Medical Depot Company experienced typical problems in closing Base K. With only a few experienced officers remaining assigned to the depot and only an inexperienced combination of inexperienced depot enlisted men, enlisted men from a tank destroyer battalion, Filipino civilians, and 325 Japanese prisoners of war, 29,431 measurement tons of supplies were processed for shipment to either Manila, Japan, Korea, or the United States. Packing and crating materials were adequate. However, certain essential items such as stencil machines were not available, and packages had to be marked in freehand.

The disposition of surplus property in the Philippines was a race against time since the tools for accomplishment—manpower and shipping space—were rapidly diminishing. The Supply Division was fortunate to have Maj. (later Lt. Col.) Clarence Retzky, MAC, as stock control officer. Electric accounting machines were used in the repeated computing of levels and the issuing of appropriate disposition instructions.[26]

UNUSUAL PROBLEMS OF MEDICAL SUPPLY

Loss of Drugs

The loss of biological products as a result of passing expiration dates in the theater was of considerable concern to the AFWESPAC supply service, and plans were developed to provide biologicals within the optimum use to units. Smallpox vaccine with a 3-month expiration date under routine supply processing would be outdated before it was received in the theater. As a result, key depots at Hollandia and Manila were established with stock levels based on consumption studies. All stocks of vaccine were shipped from the United States on class I priority, and shipments within the area were made by air to

[25] See footnote 9 (2), p. 538.
[26] See footnote 9 (2), p. 538.

insure use before expiration dates. Undoubtedly, a high percentage of "outdated" biologicals were potent and suitable for use. Development of potency determination facilities by theater medical laboratories appeared feasible to permit the salvaging of a large quantity of these products.

The shortage of biological and pharmaceutical sets at medical depots presented a problem which was solved by designating the 19th Medical General Laboratory at Luzon as the central storage and issue agency for these products. Requisitions went directly from hospitals and consuming units to the laboratory. Items not manufactured by the laboratory were requisitioned from the United States for direct delivery to the 19th Medical General Laboratory.

Another factor in efficiency of storage operations and deterioration of supply packaging was the low priority given warehouse construction. The use of newly developed plastic sheeting as an interim measure seemed desirable as canvas tarpaulins were not available for depot use in the quantities required.

Because of the studies of the Schistosomiasis Commission and other laboratory requirements, an unusually large requirement for laboratory animals developed. Australian sources were becoming exhausted, and transportation from the United States was an important consideration. It was decided to establish a breeding colony at the 19th Medical General Laboratory. Four airplane loads of breeding stock were obtained from the United States for direct delivery to Manila. The final shipment of 10,000 white mice, 600 guinea pigs, and 200 hamsters was received on 29 September 1945. Losses en route were negligible. Food pellets were requisitioned from the United States until sources were developed in the Philippines.

Probably the most acute problem of the medical service in the Philippines was the loss of medical supplies by pilferage. Depot areas were not fenced until late 1945, and truck convoys en route from the port area to the numerous depot locations were frequently hijacked. Medical supplies brought fantastic prices on the black market. Pilferage was not confined to the shoplifting tactics experienced in U.S. depots, but consisted of organized armed raids by day and night. As a result of this problem, penicillin was actually in short supply status early in 1946.[27]

Supply for Other Services

The Army Medical Supply System provided essential medical supplies to the Navy, Army Air Forces, Marines, Royal Australian Air Force, and other services toward the end of the war. In June 1945, 70 tons of supplies were provided the naval station at Subic Bay. In routine procedure, Army medical depots supplied Navy ships in their areas. In November 1945, issues were restricted to requisitions authenticated by appropriate Navy commands. Typical daily-diary entries showed unanticipated requirements for U.S.O. shows, a hearing aid for General Yamashita to enable him to hear his interpreter during the War Trials, and requests for equipment for a Coast Guard dispensary

[27] See footnote 9 (2), p. 538.

and for 100,000 Atabrine (quinacrine hydrochloride) tablets for the Royal Australian Air Force.[28]

GENERAL CONSIDERATIONS AND CONCLUSIONS REGARDING MEDICAL SUPPLY IN WORLD WAR II

Introduction

The story of medical supply in World War II was one of frequent frustration and confusion which evolved into success.

After the Japanese severely crippled the U.S. Pacific Fleet at Pearl Harbor and followed up by driving U.S. forces from the Philippines, the supply service in the Pacific had to start on a shoestring. The hard lessons learned in those early weeks and months furnished the experience and taught the lessons put to good use in later campaigns, particularly in the invasion of the European Continent.

Prewar Planning

Numerous errors of judgment made in the period of austerity between World Wars I and II prevented adequate supply planning. Based on the false assumption that the outbreak of the war would be preceded by a formal mobilization day and the equally false assumption that there would be a manpower ceiling of 4 million men, the supply posture was much too rigid, and planning was totally inadequate. Lack of funds and a woefully inadequate reserve of medical supplies and equipment were responsible for the use of obsolete medical kits, chests, and hospital assemblies.

Personnel Problems

In September 1939, 4 officers and 27 civilians were on duty in the Finance and Supply Division, Office of The Surgeon General. By the time of Pearl Harbor, the division had become one of the 12 major divisions of the Surgeon General's Office with a complement of 16 officers and 201 civilians. As a result of expanding supply needs after Pearl Harbor, many willing but inexperienced supply officers came into the system overnight. It was not until 1943, when formal training for medical supply officers became a part of the course at the St. Louis Medical Depot Maintenance School, that the supply of trained officers began to meet the demand. By bringing in leading businessmen, such as Herman C. Hangen, J. C. Penney Co.; Edward Reynolds, Columbia Gas and Electric Corp., who became chief of Supply Services; and many others from civilian life, adequate leadership for the supply program became a reality.

Depot Organization

To eliminate the merry-go-round procedure used to requisition items, the key depot system was established. Certain depots were responsible for certain

[28] See footnote 9 (2), p. 538.

types of supplies and equipment. Efficient depot operations in the United States eliminated hoarding and rushed the requisitioned supplies to their assigned destinations. Storage space expanded from 1 million to 13 million square feet in the course of a year amid a mad rush for depot space. New depots or medical sections were established in Kansas City, Kans., Seattle, Wash., Atlanta, Ga., and Richmond, Va., to handle the expanding need for medical supplies.

Automatic Supply

Shortly after Pearl Harbor, the MMU (medical maintenance unit), a standard assemblage, comprising about 700 items and weighing 15 tons and intended for automatic supply of 10,000 men for 30 days, was developed.

Designed primarily for use in overseas theaters and forward bases for the initial phases of development, the medical maintenance unit had a primary weakness of inflexibility. Forward echelons often relied on these units for a longer period of time than was intended, with a resulting serious shortage of some items and an oversupply of others.

An even more serious weakness of the medical maintenance unit, particularly in the European theater, was its inability to ship complete units. Split shipments occurred most frequently in the days preceding D-day in Europe.

To compensate for these weaknesses, other types of MMU's with a smaller number of items of less tonnage were developed and used successfully in Sicily and in Italy, as well as in the Pacific.

Maintenance, Repairs, and Spare Parts

The maintenance program of the Supply Division, SGO, was born of necessity. Virtually nonexistent at the beginning of World War II, it became a fully functioning program in all theaters by the end of the war. The servicing of medical equipment was strictly a wartime policy. Maintenance of medical equipment before the war was handled at on-post shops by other technical services or by local manufacturers of the specific equipment. Poor planning for repairs in North Africa precipitated numerous problems with broken X-ray screens, as well as shattered glass tubing and damaged knobs on steam sterilizers. Without an established maintenance program, the repair of broken items was almost nil, and only superb and ingenious Rube Goldberg techniques saved a catastrophe. By the time of the invasion of Europe, some provision for maintenance had been made and, gradually, full operation was reached with the maintenance section's being attached to the base platoons of the medical depots. Well-trained graduates of the St. Louis Medical Depot Maintenance School filled the need for trained technicians.

In the Pacific theaters, medical equipment repair was more difficult because of the lack of trained technicians and the distance between island bases. Late in the war, it was found practical to send two barges outfitted with equipment and staffed with trained personnel on a scheduled round of the various bases to make repairs and dispense spare parts.

During World War II, it was learned that the Medical Department should not depend on manufacturers' shops to maintain equipment in an emergency. Cannibalization of parts or exchange was not a satisfactory solution because of the huge backlog of unserviceable items which developed.

Development of Special Items of Equipment

Perhaps one of the most outstanding contributions of the medical supply service in World War II was the development of artificial (acrylic) eyes, camouflage dressings, jungle kits, aluminum litters, arch supports, and orthopedic braces.

The optical program itself became an important part of operations in the European theater. More specifically, a mobile optical repair unit was on the beaches of Normandy as early as 3 days after D-day.

More than 180,000 pairs of spectacles were repaired from D-day to June 1945, and more than 120,000 pairs of glasses were issued.

Until early 1944, when the new acrylic eye was developed by European theater dental officers, large numbers of artificial (glass) eyes had to be purchased in Italy. The development of the acrylic eye eliminated the problem of source of supply and the necessarily wide assortment of sizes, shapes, and colors which would be required.

To protect the wounded soldier from sniper fire, particularly in the jungle-infested areas of China, Burma, India, and the Pacific, olive-drab camouflage dressing was created and used with care to avoid any probable toxicity which might occur because of the dyes involved.

Another item used successfully in the Pacific was the jungle kit which was adopted after the Guadalcanal Campaign. Varying in size from a small pouch, which was carried on the individual soldier's belt, to a much larger unit carried on the back, the jungle kit contained antimalarial water-purification tablets, salt tablets, skin disinfectants, insect repellants, and vitamins.

Early in the war, it became obvious that in a fluid type of fighting such as in the Pacific and in Italy, it would be necessary to transport both medical equipment and patients over rough terrain in an expeditious yet comfortable manner. Jeep brackets were developed so that a jeep could carry three litters easily from the forward area to the rear. When available, aluminum litters were widely used because of their light weight.

The development of the blood bank and blood plasma made blood a standard item of supply, as it was handled in the European theater and the Pacific as part of the Medical Supply System.

Development of Packaging and Packing

At the beginning of World War II, some of the first shipments sent overseas fell apart, and glass containers shattered. It became necessary to develop better packaging specifications. The handling of loose or mixed issues was par-

ticularly poor at the beginning of the war, and because of the lack of standardization, packing in a variety of containers was in use.

After much experimentation in the North African and Sicilian campaigns, waterproof medical packs weighing 70 pounds were developed and used in the invasion of Italy and led to the use of waterproof boxes in both Europe and the Pacific. As a result of the Voorhees mission to the European theater, an expanded packing and crating program was swiftly and successfully carried out.

With the development of a skid-loading program which had been introduced in the Attu Campaign of April 1943, supplies were moved rapidly from the depot to the field. By using this method, surgical instruments were packed together as were other special items.

One of the greatest boons to unloading of supplies was first used on the beaches of North Africa. The marking of packages and boxes with the color appropriate to the technical service allowed for effective sorting of boxes by natives who could not read the accompanying shipping documents.

Overcoming Weaknesses

Numerous shortcomings, tragedies, handicaps, and errors hindered supply operations. Despite losses which resulted from sinking of ships, poor handling of supplies on the beaches, enemy destruction of depots and medical installations, lack of control of transportation, nonmedical use of medical items, pilferage, and ineffective property exchange, medical supplies were delivered and used in sufficient quality and quantity to allow the effective treatment of the wounded and the noncombatant disabled casualty. The effective use of missions to the various overseas commands helped straighten out some very intolerable and seemingly impossible situations.

As the war came to a close, careful planning, new innovations, and sheer industriousness had made the supply of the Philippines and Okinawa campaigns much more efficient. The massive movement of units and supplies from Europe to the Pacific never was necessary because of the sudden surrender of Japan.

APPENDIX A

Medical Depot Information

TABLE 1.—*Medical sections, general depots and medical depots, 1939–46*

Name or location	Date of activation	Warehouse storage space (square feet)	Missions
Atlanta ASF Depot, Medical Section, Conley, Ga.	1 Nov. 1941	681, 000	1. Receive and store all supplies for theater-of-operations type hospitals. 2. Assembly of theater-of-operations type hospitals. 3. In 1945, was changed to distribution to area served by Savannah. 4. Record repository in July 1945. 5. Key depot to receive and store trucks in August 1945. 6. Receive and store excess medical depot items in December 1945.
Columbus Medical Depot, Medical Section, Columbus, Ohio.	Before 1939	282, 000	1. Assembly of medical maintenance units for lend-lease. 2. Assembly of civilian aid defense supply (CAD).
Marietta General Depot, Medical Section, Marietta, Pa.	December 1941; closed March 1942.	175, 400	International Aid Depot.
New Cumberland ASF Depot, Medical Section, New Cumberland, Pa.	Before 1939	138, 000	1. Storage and distribution of general supplies for First and Second Service Commands and State of Pennsylvania. 2. Filler depot and general supply for Brooklyn and New York Ports of Embarkation.
New York General Depot, Medical Section, New York Port of Embarkation, Brooklyn, N.Y.	Before 1939	623, 700	1. Procured major portion of medical supplies and equipment before World War II and during early part of war. 2. Distribution depot for eastern seaboard. 3. Moved to Bush Terminal in January 1941 and redesignated New York Medical Depot on 1 July 1941.

TABLE 1.—*Medical sections, general depots and medical depots, 1939–46*—Continued

Name or location	Date of activation	Warehouse storage space (square feet)	Missions
Pueblo Ordnance Depot, Medical Section, Pueblo, Colo.	15 Apr. 1943, and as subdepot of Denver, 20 Sept. 1945.	400, 000	Storage depot for reserve medical supplies.
Richmond General Depot, Medical Section, Richmond, Va.	1 June 1941	350, 000	1. Port filler depot for Hampton Roads and Charleston Ports of Embarkation. 2. Port filler depot for New York Port of Embarkation for all items, for shipments passing through Philadelphia and all ports south.
San Antonio ASF Depot, Medical Section, San Antonio, Tex. (was a quartermaster depot in 1942).	Before 1939	306, 000	Distribution depot for Texas, excluding area by Denver.
Savannah General Depot, Medical Section; ASF in 1943, general depot 16 May 1946.	15 Jan. 1941 (subdepot of Atlanta Medical Section, 1945).	670,000	1. Distribution depot for Virginia, North Carolina, South Carolina, Georgia, and Florida. 2. Supervising operation of, and furnishing supplies for, Miami Medical Supply Point (Florida).
Schenectady ASF Depot, Medical Section, Schenectady, N.Y.	Before 1939	227,000	Port filler depot for Brooklyn and New York Ports of Embarkation for drugs, chemicals, biologicals, surgical dressings, and supplies for field equipment and special kits.
Seattle ASF Depot, Medical Section, Seattle, Wash. (was a quartermaster depot with Medical Section established in May 1941).	August 1941	300,000	1. Distribution depot for Washington, Oregon, and Alaska. 2. Also became a key depot for classes IV and V. 3. Built hospital assemblies, 1942 to April 1944. 4. 1944—Supply to troops in the Pacific.

TABLE 1.—*Medical sections, general depots and medical depots, 1939–46*—Continued

Name or location	Date of activation	Warehouse storage space (square feet)	Missions
Shamokin General Depot, Medical Section, Shamokin, Pa.	19 July 1941; closed February 1942.	35,000	International Aid Depot.
Sharonville Engineer Depot, Medical Section, Sharonville, Ohio.	22 Dec. 1942----	345,600	International Aid Depot.
Utah General Depot, Medical Section, Ogden, Utah.	15 Sept. 1941---	294,000	1. 1942—Assembly, storage, or issue of medical maintenance units for troops of Western Defense Command of various Pacific theaters. 2. A backup depot for San Francisco and Los Angeles Medical Depots. 3. To act as a collecting point for medical supplies and numbered shipments which, due to shortages, made it necessary to ship from other depots. 4. 1944—changed to initial issue to Communications Zone of tactical and hospital assemblies and backup for port filler depots.
Voorheesville General Depot, Medical Section, Voorheesville, N.Y.	December 1941; closed March 1942.	43,500	International Aid Depot.
Binghamton Medical Depot, Binghamton, N.Y. (see also New York Medical Depot).	9 Jan. 1943-----	618,000	1. Key depot for special items (teeth, optical) for all depots and ports. 2. Filler depot for Brooklyn and New York Ports of Embarkation.
Chicago Medical Depot, Chicago, Ill. (Medical Section, Chicago Quartermaster Depot).	April 1942; Chicago Medical Depot (10 Dec. 1940).	576,000	1. Distribution depot for Fifth, Sixth, Seventh, and Eighth Service Commands. 2. Key depot for special items.

TABLE 1.—*Medical sections, general depots and medical depots, 1939–46*—Continued

Name or location	Date of activation	Warehouse storage space (square feet)	Missions
Denver Medical Depot, Denver, Colo. (in 1945 was an ASF, Branch Medical Depot, class IV, for Rocky Mountain Area).	1 June 1942----	535,000	1. Distribution depot for Rocky Mountain Area. 2. Key depot for drugs, chemicals, biological products, surgical supplies; laboratory, X-ray, dental, pharmacy, hospital and field equipment and supplies, special kits or assemblies for San Francisco and Los Angeles Medical Depots and Seattle Medical Section. 3. Assembly of Zone of Interior hospitals for western United States. 4. Depot for returned material; depot to operate a Medical Depot fifth-echelon shop for reclamation or repair of unserviceable medical depot property.
Kansas City Medical Depot, Kansas City, Kans.	1 Feb. 1942----	446,000	1. Assembly of field equipment for tactical supplies for Zone of Interior or theaters of operations. 2. Key depot for selected biologicals; unit assemblies for all depots and ports.
Los Angeles Medical Depot, Los Angeles, Calif.	1 June 942----	225,000	1. Distribution depot for southern California and California-Arizona Maneuver Area. 2. Filler depot for Los Angeles Port of Embarkation.
New York Medical Depot, New York, N.Y. (Brooklyn).	1 July 1941----	1,964,000	To receive, warehouse, and ship medical depot supplies (see Binghamton Medical Depot for changes).
Louisville Medical Depot, Louisville, Ky. (holding and reconsignment point, 1942; war aid depot, 1942; quartermaster depot, September 1942; ordnance depot, 10 Oct. 1942).	24 July 1943----	1,713,000	1. Storage depot for reserve medical supplies. 2. Storage and issue of medical supplies for International Aid (lend-lease).

TABLE 1.—*Medical sections, general depots and medical depots, 1939–46*—Continued

Name or location	Date of activation	Warehouse storage space (square feet)	Missions
St. Louis Medical Depot, St. Louis, Mo.	9 Mar. 1943 (in existence in 1918 or before).	1,766,000	1. Distribution depot for Kentucky, Tennessee, Alabama, Mississippi, Missouri, Kansas, Oklahoma, and Scott Field. 2. Key depot for medical depot supplies, drugs, chemicals, biologicals; surgical, laboratory, pharmacy, dental, X-ray, hospital, veterinary, and field equipment and supplies, special kits and assemblies, serving Binghamton and Chicago Medical Depots and San Antonio and Savannah ASF Depots of Zone of Interior. 3. Key depot for catalog-selected items, veterinary equipment and supplies, serving all depots and ports. 4. Port filler depot, New Orleans Port of Embarkation. 5. Operated training schools (officers and enlisted men). 6. Operated medical depot repair shop.
San Francisco Medical Depot, Oakland, Calif. (was medical section of San Francisco General Depot).	1 July 1942 (in existence before World War I, about 1917).	714,800	1. Distribution depot, key depot for west coast ports and filler depot. 2. Distribution depot for northern California. 3. Key depot for medical shortages on port requisitions received by Los Angeles Medical Depot and Medical Section of Seattle ASF Depot. 4. Port filler depot for San Francisco Port of Embarkation.
Toledo Medical Depot, Toledo, Ohio.	Before June 1941 (lease executed 10 Dec. 1940).	854,000	1. Receipt, inspection, and storage of medical depot supplies and equipment from industrial plants and other depots. 2. Export packing, assembling, and shipment of theater-of-operations type hospitals.

APPENDIX B

Medical Lend-Lease Statistics

TABLE 1.—*Military lend-lease (medical shipments), 11 March 1941–3 September 1945*

Country	1941 [1]	1942 [1]	1943	1944	1945	Total
Belgian Congo				$115,000	$51,000	$166,000
Bolivia			$115			115
Brazil			180,000	248,000	143,000	571,000
Canada		$12,000	30,000	84,000	23,000	149,000
Chile				54,000	7,000	61,000
China	$220,000	3,107,000	1,706,000	3,920,000	2,468,000	11,421,000
Columbia				152,000	109,000	261,000
Costa Rica					200	200
Cuba			200	44,500	300	45,000
Dominican Republic				15,500	2,500	18,000
Ecuador		1,000	110,000	287,000	40,000	438,000
French Africa			2,769,000	1,950,000	449,000	5,168,000
Greece				1,400		1,400
Haiti		250	1,000	48,750		50,000
Honduras				160		160
Iran			8,000	139,000	3,000	150,000
Mexico				59,000	91,000	150,000
Netherlands			49,000	20,000	13,000	82,000
Nicaragua				15,000	4,000	19,000
Norway			23,000	19,000	76,000	118,000
Peru		4,000	74,000	203,000	28,000	309,000
United Kingdom and dominions	56,000	4,007,000	16,286,000	16,396,000	12,821,000	49,566,000
Uruguay				300	350	650
U.S.S.R.		4,624,000	9,284,000	13,764,000	10,401,000	38,073,000
Venezuela				2,000	10,000	12,000
Yugoslavia				120,000	14,000	134,000
Total	$276,000	$11,755,250	$30,520,315	$37,657,610	$26,754,350	$106,963,525

[1] There was no distinction between military and civilian lend-lease shipments before 1943. These columns, therefore, include indeterminate quantities of civilian medical supplies.

TABLE 2.—*Civilian lend-lease (medical) shipments, 1 January 1943–3 September 1945*

Country	1943	1944	1945	Total
Belgian Congo		$87,000		$87,000
Ethiopia		34,000		34,000
French Africa	$61,000	1,210,000	$1,940,000	3,211,000
Iran		1,250		1,250
Iraq		6,000		6,000
Saudi Arabia		6,000	3,000	9,000
Syria		7,000	370	7,370
Turkey	1,000	180,000		181,000
United Kingdom and dominions	127,000	5,057,000	2,407,000	7,591,000
Miscellaneous	7,000	1,292,000		1,299,000
Total	$196,000	$7,880,250	$4,350,370	$12,426,620

TABLE 3.—*Foreign shipments of medical supplies other than lend-lease, 1942–45*

Agency	1942	1943	1944	1945
Russian War Relief Society	$1,770,448	$3,241,253	$1,648,463	$834,264
Procurement Division, U.S. Treasury	----------	----------	22,190	20,435,709
American Red Cross:				
To U.S.S.R.	3,553,330	431,348	45,189	----------
To Greece	----------	36,534	3,955	136
To Ireland	25,961	136,428	69,669	----------
Total	$5,349,739	$3,845,563	$1,789,466	$21,270,109

APPENDIX C

Sample Equipment Lists (Evacuation, Station, and General Hospitals)

Item No.	Item	Unit	Amount		
			Evacuation hospital [1] (400-bed)	Station hospital [2] (500-bed)	General hospital [3] (1,000-bed)
	Class 1				
10025	Acetic Anhydride, CP Analyzed, ACS.	¼ lb			2
10030	Acetone, ACS	lb		8	18
10050	Acetophenetidin, USP	lb		1	2
10070	Acid, Acetic, Glacial, USP	lb		2	4
10090	Acid, Acetylsalicylic, USP	lb		2	5
10100	Acid, Acetylsalicylic, USP 5 Gr. Tab.	1,000	5	40	75
10102	Acid, 1 Amino-2 Naphthol–4 Sulfonic.	25 gm			2
10105	Acid, Benzoic, USP	lb		2	5
10120	Acid, Boric, USP	5 lb	3	20	40
10122	Acid, Boric, Ointment, USP	4 oz		20	40
10123	Acid, Boric, Ointment, USP	lb	2	12	25
10155	Acid, Formic, CP Analyzed, ACS	¼ lb			1
10157	Acid, Hydrobromic, Purified, 34%	¼ lb		1	1
10160	Acid, Hydrochloric, ACS	lb		6	10
10190	Acid, Molybdic, Anhydride, ACS	¼ lb		1	2
10200	Acid, Nitric, ACS	lb		3	6
10240	Acid, Oxalic, ACS	¼ lb		2	5
10255	Acid, Para-Aminobenzoic	25 gm			1
10260	Acid, Phosphoric, ACS	lb		1	1
10270	Acid, Phosphotungstic, Crystals, Reagent.	oz		1	2
10278	Acid, Picric, CP	5 gm		2	2
10280	Acid, Picric, USP	oz		1	1
10300	Acid, Salicylic, USP	¼ lb		5	10
10320	Acid, Sulfanilic, ACS	oz		1	2
10328	Acid, Sulfosalicylic, CP Analyzed	¼ lb			1
10340	Acid, Sulfuric, ACS	lb		6	12
10360	Acid, Sulfuric, Commercial	5 gal		1	1
10400	Acid, Tannic, USP	¼ lb	5	10	20
10410	Acid, Tartaric, USP, Powder	lb		4	6
10418	Acid, Trichloracetic, CP Analyzed	¼ lb		1	2
10420	Acid, Trichloracetic, USP	oz		2	3

[1] Medical Department Equipment List, Evacuation Hospital, 400-bed, 1 June 1943.
[2] Medical Department Equipment List, Station Hospital, 500-bed, 12 July 1942.
[3] Medical Department Equipment List, General Hospital, 1,000-bed, 1 May 1943.

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
10460	Agar, Bacteriologic	lb		5	10
10480	Alcohol, USP	qt	24		
10490	Alcohol, USP	5 gal	10		
10497	Alcohol, Amyl, ACS	¼ pt		1	1
10570	Aloin Compound, Pill or Tablet	1,000	2	10	20
10585	Aluminum Chloride, CP Analyzed	¼ lb			1
10590	Aluminum Potassium Sulphate, Reagent.	¼ lb		1	1
10600	Ammonia, Aromatic Spirit, USP	pt	2	5	10
10650	Ammonium Chloride, USP	lb		20	20
10660	Ammonium Chloride, Troches, USP X.	1,000	3	16	25
10665	Ammonium Molybdate, CP Analyzed	¼ lb			1
10670	Ammonium Oxalate, ACS	¼ lb		1	2
10675	Ammonium Sulfamate, Technical	lb		1	1
10680	Ammonium Sulfate, ACS	¼ lb		1	1
10685	Ammonium, Thiocyanate, CP Analyzed.	¼ lb		1	1
10690	Amyl Nitrate, USP, 5 minim, Amp	pkg	2	4	8
10700	Aniline for Microscopic Use, ACS	¼ lb			4
10710	Antimony and Potassium Tartrate, USP.	oz		1	1
10730	Apomorphine Hydrochloride, $\frac{1}{10}$ gr., Hypo, Tab, USP.	20	2		
10835	Ascorbic Acid, USP, 25 Mgm tab (Vitamin C).	100		15	30
10840	Aspidium, USP	oz		1	2
10845	Atabrine Tablets, 100 Mgm	100	66	3	6
10846	Atabrine Tablets, 100 Mgm	1,000	6		
10850	Atropine Sulphate, USP	⅛ oz	1	1	1
10860	Atropine Sulphate, USP, $\frac{1}{150}$ Gr. Hypo Tab.	20	25	25	50
10880	Azochloramid	qt	10	50	100
10900	Balsam Canada Turpentine, USP Reagent, 70% in Xylene, ACS Standard, Paper Filtered.	oz		1	7
10970	Barium Sulfate, USP	10 lb		9	20
10980	Beef Extract, NF VI	¼ lb		6	12
10984	Bentonite, USP	lb		5	10
10990	Benzidine, USP, Reagent	oz		1	1
11040	Bismuth Subcarbonate, USP	lb		8	15
11063	Bismuth Subsalicylate, USP, for Parenteral Injection.	ea		15	30
11080	Bromine, ACS	oz			1
11087	Caffeine, Citrated, USP	¼ lb		2	5
11105	Caffeine with Sodium Benzoate, 7.5 Gr. Amp.	doz	10	15	25

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
11110	Calamine, Prepared, NF VI	lb	5	8	15
11140	Calcium Carbonate, Precipitated, USP.	lb		6	12
11150	Calcium Carbonate (Marble chips)	lb		1	1
11160	Calcium Chloride, USP	¼ lb		3	6
11170	Calcium Chloride, Technical, Lumps	lb		1	1
11175	Calcium Gluconate (10 cc. Amp, 10%).	doz	2	3	6
11177	Calcium Gluconate, USP	¼ lb		6	12
11180	Calcium Hydroxide, USP	¼ lb		3	6
11187	Calcium Oxide, NF VI	¼ lb		1	1
11270	Carbon Tetrachloride, USP	¼ lb		2	2
11300	Cedarwood Oil (Clearing), USP Reagent.	¼ lb			2
11310	Cedarwood Oil (Immersion), USP Reagent.	oz		3	6
11330	Chalk, Prepared, USP	lb		4	8
11370	Chloral Hydrate, USP	¼ lb	1	5	10
11380	Chloroform (for anesthesia)	¼ lb	30	12	12
11390	Chloroform (not for anesthesia), USP.	lb		3	5
11395	Cholesterol	10 gm		1	1
11400	Chromium Trioxide, USP	oz		1	1
11430	Coal Tar, Crude (Pix carbonis), NF	lb		1	2
11443	Cobalt (OUS) Sulfate, CP Analyzed	oz		1	2
11450	Cocaine Hydrochloride, USP	¼ oz	2		
11490	Codeine Sulfate, USP ½ gm. tab	500	7		
11500	Collodion, USP	oz	25	50	48
11505	Compound Cathartic, pill or tablet, NF VI.	1,000		4	8
11520	Copper Foil, USP Reagent	oz		1	1
11560	Creatinine and Zinc Chloride, reagent.	0.5 gm		1	1
11600	Cresol, Saponated Solution	5 gal	3	24	38
11615	Cupric Sulfate, USP	lb		5	10
11620	Dextrin, Bacteriologic	100 gm		1	1
11630	Dextrose, USP	lb		25	25
11640	Dextrose, Bacteriologic (Glucose), Anhydrous, Powder.	¼ lb		2	4
11645	Dextrose, 10% in Sterile Distilled Water.	1,000 cc	30	48	96
11650	Dextrose, 5% in Physiological Sodium Chloride Solution.	1,000 cc	120	96	180
11665	Digitalis, tab or capsule, 1 USP XII Unit.	100	3	15	25
11675	Digitalis Hypo Solution, 1 Ampule Equals 1 USP XII Unit.	doz	3	20	40

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
11680	Dimethylaminoazobenzene, Reagent	10 gm		1	1
11685	Dimethyl-A-Naphthylamine	25 gm		2	2
11690	Diphenylamine, Reagent	oz		1	2
11700	Dulcitol	10 gm		2	4
11720	Emetine Hydrochloride, USP ⅓ Gr. Hypo Tab.	20	4	15	30
11738	Emulsion Base, No. 1 (Medium)	pt		6	12
11739	Emulsion Base, No. 2 (Thin)	pt		6	12
11747	Ephedrine Sulfate, NF VI, 1 cc Amp., ¾ Gr.	doz	80	48	100
11749	Ephedrine Sulfate, USP	oz			3
11750	Epinephrine Hydrochloride, USP Solution.	oz	10	12	24
11760	Epinephrine Soluble Salt, 1/200 Gr. Hypo Tab.	20	10	25	50
11790	Ether (for Anesthesia)	¼ lb	2,000	1,000	1,000
11793	Ether, Petroleum, CP Analyzed	lb			6
11840	Eugenol, USP	oz		6	10
11890	Ferric Ammonium Sulfate, ACS	¼ lb			2
11900	Ferric Chloride, ACS	¼ lb		1	2
11905	Ferric Chloride, USP, Solution	pt		2	3
11933	Ferrous Sulfate, USP, 5 Gr. tab	1,000		6	12
11935	Ferrous Sulfide, Sticks	lb			1
11980	Fl Ex Ergot, USP	oz	6	12	24
12030	Fluorescein, Soluble, USP	oz	1	1	1
12050	Formaldehyde Solution, USP	qt	4	12	25
12070	Formaldehyde Solution for Colloidal Gold, Neutral, Reagent.	lb			3
12135	Gentian Violet Powder, Medicinal	lb		1	2
12180	Glycerin, USP	lb	5		
12190	Glycerin, USP	10 lb		5	10
12210	Glyceryl Trinitrate, 1/100 Gr. Hypo Tab.	20	2	3	5
12230	Glycyrrhiza and Opium Compound Mixture, USP Tab.	1,000	2		
12250	Gold Chloride, Reagent Grade	gram			10
12280	Homatropine Hydrobromide, USP	15 gr	1	5	10
12300	Hydroquinone	¼ lb			1
12310	(Ichthyol) Bitumen Sulfonatum, NF VI.	¼ lb		5	10
12315	Indigo Carmine	10		5	10
12320	Inosite (Meat Sugar)	gram		5	10
12325	Insulin, Protamine Zinc	10 cc		15	30
12335	Insulin, U–40	10 cc	5	30	50
12350	Iodine, USP	¼ lb	3	10	20
12387	Iodophthalein, Soluble, USP, for Oral Use.	100 gm	3	3	5

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
12420	Iron Wire, Reagent, Standard	oz		1	1
12450	Jack Bean Meal	¼ lb		1	1
12452	Jelly, Lubricating	tube	10	12	25
12470	Lactose, USP	lb		7	15
12480	Lactose, Bacteriologic	¼ lb		2	6
12485	Lard, Benzoinated, USP	lb		6	12
12490	Lead Acetate, ACS	lb		2	4
12527	Liquor Carbonis Detergens, NF (Solution of Coal Tar).	pt		1	2
12533	Lithium Carbonate, CP Analyzed	¼ lb		1	1
12535	Lithium Citrate, NF VI	oz		2	2
12537	Lithium Oxalate, CP	¼ lb		1	2
12565	Liver, Purified Extract, USP, 50 Units.	10 cc		20	20
12610	Magnesium Carbonate, USP	lb		5	10
12620	Magnesium Oxide, Heavy, USP	lb		10	15
12640	Magnesium Sulfate, USP	4 lb	12		
12650	Magnesium Sulfate, USP	50 lb		5	10
12670	d-Mannite, CP	100 gm		2	2
12690	Menthol, USP	oz		5	10
12700	Mercurial Ointment, Mild, USP	lb	1	15	30
12740	Mercuric Oxide, Red, Reagent	¼ lb		1	1
12750	Mercuric Oxide, Yellow, Ointment, USP.	¼ oz	10	12	25
12820	Mercurous Chloride Ointment, Mild, 1 lb.	lb		5	10
12830	Mercury, USP	¼ lb		9	
12840	Mercury, USP	5 lb			1
12850	Mercury, Ammoniated Ointment, USP.	lb	5	10	20
12852	Mercury Bichloride, USP	¼ lb			1
12854	Mercury Bichloride, Large Poison Tab, USP.	250	2	12	5
12859	Methanol, ACS	lb	2	8	15
12870	Methenamine, USP, 5 gm. tab	1,000		3	
12890	Methyl Red, USP, Indicator	oz		1	2
12900	Methyl Salicylate, USP	¼ lb		25	50
12955	Morphine Sulfate, USP ¼ gm. Hypo tab.	20	400		
12987	N (1-Naphthyl) Ethylenediamine Dihydrochloride.	10 gm		1	1
13015	Nicotinic Acid Amide, NNR, 50 MGM tab.	100		8	15
13070	Oil, Castor, USP	gal	1	5	10
13100	Oil, Cod Liver, USP	pt		10	24
13120	Oil, Cottonseed, USP	gal		5	10
13200	Oil, Theobroma, USP	¼ lb		5	10

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
13220	Oil, Turpentine, USP	qt	1	7	15
13250	Orthotolidine, Recrystallized Reagent.	oz	1	1	2
13255	Para-Aminodimethylaniline Monohydrochloride.	10 gm		1	1
13257	Para-Dimethylaminobenzaldehyde	10 gm		1	1
13260	Paper, pH Indicator, Strips	100	2	20	20
13270	Paraffin, Refined, for Histological and Pharmaceutical use, MP 54.4°–56.1° C.	lb		3	10
13275	Paraffin, Refined, for Histological and Pharmaceutical use, MP. 51.6°–52.8° C.	lb		3	5
13280	Paraffin, Refined, for Histological use, MP. 48.9°–50.6° C.	lb			4
13300	Paraldehyde, USP	¼ pt	3		20
13310	Peptone, Proteose, Bacteriologic	lb		1	1
13320	Peptone, Dried, USP Reagent	lb			2
13330	Peruvian Balsam, USP	lb		5	10
13335	Permutit	lb			1
13350	Petrolatum, USP	10 lb	2	8	15
13370	Petrolatum, Liquid, Heavy, USP	gal	1	5	10
13390	Phenol, USP	lb	1	3	5
13396	Phenobarbital, USP ½ Gr. Tab	100	5	10	50
13398	Phenol Red (Phenosulfonphthalein)	5 gm		1	1
13400	Phenophthalein, ACS	oz		1	1
13420	Phenosulfonphthalein, USP	10	4	6	12
13480	Physostigmine Salicylate, USP, 1/60 Gr. Hypo Tab.	20			4
13500	Physostigmine Salicylate, USP, 1/2000 Gr. Ophthalmic Disk.	50	2		2
13530	Pituitary Solution, Posterior Lobe, USP.	6	15		
13550	Potassium Acetate, USP, Granular	lb		5	10
13590	Potassium Carbonate, ACS	¼ lb			1
13600	Potassium Chlorate, USP	lb		2	5
13610	Potassium Chloride, ACS	oz			1
13630	Potassium Dichromate, ACS	¼ lb			1
13640	Potassium Ferrocyanide (Red Prussiate), ACS.	oz		1	2
13650	Potassium Ferrocyanide (Yellow Prussiate), ACS, Crystals.	oz		1	2
13660	Potassium Hydroxide, USP	¼ lb			8
13667	Potassium Iodate, CP Analyzed, ACS.	¼ lb			1
13670	Potassium Iodide, USP	¼ lb	1	5	10
13715	Potassium Oxalate, CP Analyzed	¼ lb		1	1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
13720	Potassium Permanganate, USP	lb		2	5
13730	Potassium Permanganate, USP, 5 gm. Tab.	100	1		
13740	Potassium Phosphate Dipotassium, Anhydrous Reagent.	¼ lb		2	2
13750	Potassium Phosphate Monopotassium, ACS, Anhydrous.	¼ lb		1	1
13768	Potassium Tellurite, CP	¼ oz			1
13770	Potassium Thiocyanate, Reagent	¼ lb			1
13790	Powder, Developing, X-ray, 5 gal	pkg	6		
13790	Powder, Developing, Photographic	pkg		15	30
13800	Powder, Fixing, Photographic	pkg		8	30
13800	Powder, Fixing, X-ray	pkg	6		
13802	Procaine Hydrochloride, USP, 100 MGM Amp.	10		12	25
13803	Powder, Fixing, X-ray, 1 gal	pkg	6	18	
13806	Procaine Hydrochloride, USP, 150 MGM Amp.	10	50	25	50
13810	Procaine, Hydrochloride, USP	oz	2	15	20
13820	Procaine, Hydrochloride, USP, ¾ Gr. Hypo Tab.	20		10	20
13835	Procaine Hydrochloride, Cartridge, 2% 2.4 CC.	box	10	100	150
13842	Protein, Silver, Mild, USP	¼ lb	3	40	75
13845	Protein, Silver, Strong, USP	¼ lb	2	24	40
13850	Pumice, Fine, Powder	lb			2
13860	Pumice, Medium, Powder	lb		2	2
13870	Quinidine Sulfate, USP	oz		1	2
13890	Quinine Dihydrochloride, USP, 5 Gr. Amp.	doz	1	1	2
13910	Quinine Sulfate, USP, 5 Gr. Tab	1,000	1	1	1
13930	Resorcinol, USP	¼ lb		2	4
13950	Riboflavin, NNR, 1 Mgm Tab	100		10	20
13980	Saccharose	¼ lb		1	1
14020	Saponin, Purified Powder	¼ lb		1	1
14030	Scopolamine Hydrobromide, USP, 1/100 Gr. Hypo Tab.	20	3	5	10
14050	Silver Nitrate, USP	oz	8	18	36
14060	Silver Nitrate, Toughened, USP, Pencils.	oz	1	2	5
14070	Silver Nitrate and Formaldehyde, USP.	box		3	5
14120	Soap, soft	lb	48		
14130	Soap, soft	25 lb		10	20
14136	Sodium Acetate, CP Analyzed, ACS	lb			1
14138	Sodium Barbital, CP	¼ lb			1
14140	Sodium Benzoate, USP	¼ lb		8	20

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
14145	Sodium Beta-Glycerophosphate	100 gm			1
14150	Sodium Bicarbonate, USP	lb	5	15	
14160	Sodium Bicarbonate, USP	10 lb		10	20
14170	Sodium Bicarbonate, USP, 5 Gr. Tab.	1,000	2	6	12
14190	Sodium Borate, USP	lb		5	8
14120	Sodium Bromide, USP	lb		6	12
14220	Sodium Bromide, USP, 5 Gr. Tab	500		4	10
14250–10	Sodium Calcium Hydrate, No. 8 Medium, 8–14.	1.85 lb			6
14260	Sodium Carbonate, Anhydrous, ACS	¼ lb		1	2
14270	Sodium Carbonate, Monohydrated, USP.	lb	1		
14280	Sodium Carbonate, Monohydrated, USP.	10 lb		5	10
14290	Sodium Chloride, ACS	lb		25	48
14295	Sodium Chloride, Physiological Solution.	1,000 cc	120	48	96
14300	Sodium Citrate, USP	lb		5	10
14305	Sodium Citrate, 4% Sterile Solution, 50 cc. Amp.	6	10	15	30
14310	Sodium Cyanide, ACS	¼ lb		1	1
14320	Sodium Dichromate, Technical	lb		10	10
14340	Sodium Hydroxide, USP	¼ lb		20	30
14355	Sodium Molybdate, CP Analyzed	¼ lb		1	1
14370	Sodium Nitrite, ACS	oz		2	4
14380	Sodium Nitroferricyanide, ACS	oz		1	1
14393	Sodium Perborate, USP	¼ lb		6	24
14400	Sodium Phosphate (Dibasic)	¼ lb		1	1
14405	Sodium Phosphate Crystals, CP (Monobasic).	1 lb		1	3
14408	Sodium Phosphate Crystals, CP Analyzed (Tribasic).	lb		1	3
14450	Sodium Salicylate, USP, 5 Gr. Tab	1,000		6	12
14460	Sodium Sulfate, USP	lb		5	10
14482	Sodium Sulfite, CP Analyzed	lb			1
14490	Sodium Thiosulfate, USP	¼ lb		2	4
14510	Sodium Tungstate, Reagent	¼ lb		2	4
14530	Starch, Corn, Commercial	lb		8	16
14550	Strophanthin, USP, 1/100 Gr. Hypo Tab.	20		4	5
14580	Strychnine Sulfate, USP 1/60 Gr. Hypo Tab.	20		4	10
14620	Sulfadiazine, Ointment 5%	lb	2		
14621	Sulfadiazine, CP, Powder	25 gm		2	4
14622	Sulfadiazine, 0.5 gm. (7.7 Gr) Tab	1,000	25	30	60
14623	Sulfadiazine, Sodium, USP, 5 gm Vial.	6	6	8	15

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
14625	Sulfaguanidine, Powder	lb	12	35	50
14635	Sulfanilamide, USP, Powder	lb		4	8
14636	Sulfanilamide, Crystalline, USP, 5 grams in sterile individual double-wrapped envelope.	pkg	500	100	200
14637	Sulfanilamide, USP 5 Gr. Tab	1,000	12	20	20
14641	Sulfathiazole, USP, 7.7 Gr. Tab	1,000	15	20	60
14643	Sulfathiazole, CP, Powder	oz		3	5
14644	Sulfathiazole, Sodium, 5 Gm. vial	6	10	10	20
14670	Sulfur, USP	lb	10	20	24
14700	Talc, Purified, USP	lb	5	50	50
14710	Terpin Hydrate, USP	oz		30	50
14720	Tetrachloroethylene, Capsule, 1 cc, NF VI.	100		3	5
14725	Thiamine Hydrochloride, USP, 1 Mgm Tab.	500		2	4
14730	Thymol, USP	oz		2	
14760	Thyroid, USP, 1 Gr. Tab	100		4	6
14775	Tincture Belladonna, USP	pt		5	10
14790	Tincture, Cardamon Compound, USP.	pt		4	
14840	Tincture, Nux Vomica, USP	pt		2	
14860	Tincture Opium, Camphorated, USP	pt	10		
14883	Toluene, ACS	oz		1	2
14891	Tryparsamide, USP, 2 gm. Amp	10		6	9
14892	Tryptone, Bacteriologic	lb		1	1
14897	*l*-Tyrosine, CP, for Standard	gram		1	2
14898	Uranium Nitrate, CP Analyzed, Special Crystal, ACS.	oz			1
14903	Vitamins A and D, Concentrated	100		10	20
14910	Water, Distilled, Sterile, Pyrogen-Free.	1,000 cc	48	24	48
14917	Water, Distilled, Sterile, Pyrogen-Free.	25		3	6
14920	Wax, Bone, Sterile	2 gm	4	4	12
14930	Wax, White, USP	¼ lb	1	8	10
14940	Whisky, USP	qt	24		
14950	Wool, Flat, Hydrous, USP	lb		10	20
14970	Xylene, ACS	lb	1	4	30
14980	Xylose, CP, Bacteriologic	10 gm	1	1	1
15000	Zinc Chloride, USP	¼ lb		1	1
15005	Zinc Metal, Mossy, ACS	lb			1
15010	Zinc Oxide, USP	lb			24
15020	Zinc Oxide Ointment, USP	lb	5	24	48
15025	Zinc Oxide Paste, Lassar's, NF VI	lb	2	12	24
15030	Zinc Stearate, USP	¼ lb		5	10
15040	Zinc Sulphate, USP	lb		1	1
15200	Alizarin Red "S"	10 gm			1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 1—Continued				
15210	Aniline Blue, Water Soluble	10 gm			1
15215	Azocarmine "B"	10 gm			1
15220	Bismark Brown "Y"	10 gm		1	1
15225	Biebrich Scarlet	10 gm			1
15230	Brilliant Cresyl Blue	10 gm		1	1
15287	Fast Green	10 gm			1
15290	Fuchsin, Acid	10 gm			1
15310	Giemsa Stain	gram		10	10
15320	Hematoxylin, Light	10 gm			2
15330	Janus Green "B"	10 gm			1
15360	Methyl Orange	10 gm			1
15370	Methyl Violet (Gentian Violet-Histological).	10 gm			1
15393	Nigrosin	10 gm			1
15395	Oil Red "O"	10 gm			1
15397	Orange "G"	10 gm			1
15400	Safranin "O"	10 gm		2	4
15440	Wright's Stain, Powder	0.2 gm		12	24
16089	Serum, Normal Human Plasma, Dried.	pkg	400	500	1,000
17315	Dextrose, 50% Solution, 50 cc	bottle	30	250	500
	Supplemental Items				
1K01075	Adherent, for Skin Traction	4 oz	6	6	12
1K02405	Aminophylline, NNR	25		1	2
1K02625	Aminophylline, NNR, 0.1 Gm Tab	100		2	4
1K06000	Ascorbic Acid (Vitamin C parenteral)	100	1	2	10
1K07625	Avertin Solution, NNR	100 cc		3	6
1K08100	Azochloramid, Saline Mixture, Powder.	oz	6	20	40
1K08550	Benzedrine Sulfate, NNR, 10 Mgm Tab.	250		1	
1K12900	Bile Salts, NNR, 5 Gr Tab	100			10
1K12910	Burrow's Solution Tabs, 2.27 Gm (Domeboro Improved).	500		4	
1K12960	Butyn Sulfate Powder, NNR, 5 Gm	bottle	1	1	2
1K16400	Calcium Mandelate, 0.5 Gm, 7½ Gr Tab.	200		2	3
1K17205	Carbarsone, NNR, 0.25 Gm, 3¾ Gr Tab.	20			2
1K17250	Carbarsone, NNR, 0.25 Gm, 3¾ Gr Tab.	500		3	4
1K23315	Diodoquin, 3.2 Gr Tab	500			4
1K23800	Diodrast, NNR	30 cc	6		10
1K00600	Epinephrine (Adrenalin) Hydrochloride, NNR, 1:1,000 Solution.	doz		3	5
1K24602	Ephedrine Sulfate, NNR, 0.025 Gm, ⅜ Gr in Capsule.	500		1	1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Supplemental Items—Continued				
1K24605	Ephedrine Sulfate, NNR, 0.05 Gm, ¾ Gr, in Capsule.	500		1	2
1K24812	Foille, 1 gal	bottle		3	5
1K28500	Hexylresorcinol, 0.2 Gm Pill	5		9	
1K31315	Iodochlorol (Iodized and Chlorinated Oil).	20 cc			6
1K32340	Lipiodol-Lafay, NNR, Diagnostic, 40% Iodine, 20 cc.	flask			10
1K32350	Lipiodol-Lafay, NNR Diagnostic, 40% Iodine, 5 cc.	box			10
1K34710	Mapharsen, NNR, 0.06 Gm Amp	10	8	22	45
1K34800	Mapharsen, NNR, 0.6 Gm Amp	10		9	18
1K35500	Mercuric Oxide, Yellow, USP, Powder	oz		2	
1K39220	Mercury Oxycyanide	lb		2	2
1K39700	Metaphen Ophthalmic Ointment, NNR.	doz	1	3	4
1K20615	Mikethamide (Coramine)	100	2		15
1K40112	Metycaine Solution, NNR	100		1	2
1K40120	Metycaine Solution, NNR	25		1	2
1K46600	Nupercainal Ointment	lb		1	2
1K46115	Pentobarbital Sodium, NNR (Nembutal).	500	2	4	8
1K56700	Pentothal Sodium with Sterile Distilled Water, 1 Gm Amp, 50 cc.	25	10	18	25
1K56703	Pentothal Sodium with Sterile Distilled Water, 0.5 Gm Amp, 20 cc.	25		10	25
1K59103	Pitressin Solution, NNR 1 cc Amp (20 Pressor units).	100	5	2	4
1K59105	Pitressin Solution, NNR, 0.5 cc Amp (10 Pressor units).	100		2	4
1K62100	Pontocaine Hydrochloride Solution, NNR.	10	5	2	4
1K67320	Prostigmine, Prophylactic Solution 1:4,000.	100	5	6	8
1K67340	Prostigmine, Regular Solution 1:2,000	50	8	7	15
1K74825	Seconal, 0.1 Gm (1½ Gr) Pulvule	500		3	5
1K74850	Shell Natron (Carbon Dioxide Absorbent).	can	72	48	72
1K75300	Skiodan Sterile Solution, NNR, 40% (by Volume).	50 cc		10	20
1K75625	Skiodan, 1.0 Gm Tab, NNR	100	1	6	12
1K75755	Sodium Alurate, NNR, 0.24 Gm (3½ Gr Tab.)	500		3	5
1K75825	Sodium Amytal, NNR, 0.2 Gm (3 Gr) Tab.	500	4	3	5
1K75900	Sodium Amytal, NNR, 0.5 Gm (7½ Gr) in Amp.	amp		100	200

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Supplemental Items—Continued				
1K76405	Sodium Morrhuate Solution, NNR, 5%, in Rubber-Capped Bottle.	30 cc			4
1K76410	Sodium Morrhuate Solution, NNR, 5%, 5 cc in Amp.	25		1	2
1K80400	Theobromine Calcium Salicylate, NNR, 0.5 Gm Tab.	500			2
1K80605	Thiamin, Hydrochloride Solution, NNR, 10 Mgm in 1 cc Amp.	6	25	25	
1K80610	Thiamin Hydrochloride Solution, NNR, 50 Mgm per cc.	vial		6	20
1K86800	Vitamin K, Water Soluble, Tab or Capsule.	50		2	2
1K29600	Vitamin K, Water Soluble, in 1 cc Amp.	6	3	5	24
1K61500	Vitamins, Multivitamin Capsule	bottle		25	50
1K9000	Zinc Peroxide (Medicinal Grade)	15 gm	20	50	100
1K90030	Beef, Bacto	lb		1	1
1K90040	Blood Agar Base	lb		1	2
1K90045	Blood Serum, Loeffler's	lb		1	1
1K90060	Brain Heart Infusion	lb		1	1
1K90070	Brilliant Green, Bacto	10 gm		1	1
1K90095	Citrate Agar, Simmon's	lb			1
1K91108	Crystal Violet, Bacto	10 gm		4	8
1K91115	Desoxycholate, Citrate Media	¼ lb		1	1
1K91125	Dextrose Agar, Sabouraud's	¼ lb		1	1
1K91130	Dextrose Proteose No. 3, Agar, Bacto	lb		1	1
1K91145	Double Sugar, Russell's	lb			1
1K91155	Eosin Methylene, Blue Agar, Bacto	lb		1	1
1K91160	Eosin Y, Bacto	10 gm		1	2
1K91170	Fuchsin, Basic, Bacto	10 gm		1	1
1K91180	Gelatin (Granular), Bacto	lb		1	1
1K91200	Hemoglobin, Bacto	lb		1	
1K91210	Iron Agar, Kliger's, Bacto	lb			1
1K92000	Lactose Broth, Bacto	lb		1	1
1K92015	Maltose, Bacto	100 gm		1	1
1K92025	Methylene Blue, Bacto	10 gm		2	4
1K92035	Nitrate, Agar	lb		1	1
1K92045	Nutrient Agar, Bacto	lb		1	1
1K92050	Nutrient Broth, Bacto	lb		1	1
1K92060	Ox-Gall, Bacto	¼ lb		1	1
1K92070	Peptone, Bacto	lb		1	1
1K92080	Phenol Red Tartrate Agar, Bacto	¼ lb		1	1
1K93100	Selenite-F (Enrichment)	lb		1	1
1K93115	Skim Milk, Bacto	lb		1	1
1K93130	SS Agar, Bacto	lb		1	1
1K93200	Thionin, Bacto	10 gm		1	1
1K93220	Tryptose, Bacto	lb		1	1
1K93250	Veal, Bacto	lb		1	1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Alcohol and Narcotics				
10480	Alcohol, USP	qt	24		
10490	Alcohol, USP	5 gal	10		
10495	Alcohol, USP	54 gal		10	6
10500	Alcohol, Dehydrated, USP	pt			24
10730	Apomorphine Hydrochloride, 1/10 Gr Hypo Tab, USP.	20	2	2	2
11450	Cocaine Hydrochloride, USP	¼ oz	2	5	10
11480	Codeine Sulfate, USP	oz		10	20
11490	Codeine Sulfate, USP, ½ Gr Tab	500	7	20	40
11495	Codeine Sulfate, USP, ½ Gr Hypo Tab.	20		20	40
11810	Ethylmorphine Hydrochloride, USP	⅛ oz		1	2
12955	Morphine Sulfate, USP, ¼ Gr Hypo Tab.	20	400	150	300
14850	Tincture Opium, USP	¼ pt			8
14860	Tincture Opium, Camphorated, USP	pt	10	30	60
14940	Whisky, USP	qt	24	48	72
91155	Morphine Tartrate, ¼ Gr Solution	box	100		
	Class 2				
20020	Bandage, Canton, Flannel 5-inch	doz	4	8	12
20022	Bandage, Elastic, All Cotton	doz	3	8	12
20024	Bandage, Elastic, All Cotton	doz	3	8	12
20030	Bandage, Flannel, 3-inch	doz		8	12
20040	Bandage, Gauze, Roller, 2-inch	doz	24	500	1,000
20050	Bandage, Gauze, Roller, 3-inch	doz	150	500	1,000
20060	Bandage, Gauze, Roller, 4-inch	doz	50	250	500
20080	Bandage, Muslin, 3-inch	doz		30	60
20090	Bandage, Muslin, 5-inch	doz	175	25	40
20110	Bandage, Suspensory	doz	5	32	60
20120	Bandage, Triangular	doz		10	20
20140	Cotton, Absorbent, Roll	lb	150	250	500
20150	Cotton Batting	lb	50	50	100
20160	Crinolin, 6 yd	pkg	36	100	200
20210	Gauze, Plain, 5 yd	roll	25	50	
20220	Gauze, Plain, 25 yd	roll	5	20	40
20230	Gauze, Plain, 100 yd	roll		50	150
20252	Mask, Face, Surgical	bag	2	6	12
20270	Muslin	yd	1,500	500	1,000
20325	Paper, Impervious, 5 yd	roll	25		
20350	Plaster, Adhesive, 3-inch	spool	500	750	1,500
20370	Plaster of Paris, 4 lb	tin	12	60	72
20372	Plaster of Paris, 25 lb	drum			10
20380	Silk, Impervious	yd	10		100
20390	Stockinet, 3-inch	roll	5	12	24
20400	Stockinet, 6-inch	roll	5	8	16
20410	Stockinet, 9-inch	roll	5	8	16
20420	Wadding Sheet	roll	200	100	200

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3				
30010	Adenotome, Size 2	ea		1	2
30015	Anascope, Hirschman	ea		1	2
30030	Applicator, Nasal, Steel	ea		8	12
30050	Applicator, Surgical	ea		4	6
30065	Bag, Physician's	ea		1	1
30090	Block, Bite, Adult	ea		1	2
30115	Bolt, Tibia	ea		2	6
30535	Bronchoscope, 5 MM by 30 CM, Child's	ea			1
30545	Bronchoscope, 8 MM by 40 CM, Adult's	ea		1	2
30605	Cannula, Antrum, Killian's	ea		1	1
30610	Cannula, Brain	ea		2	2
30640	Cannula, Frontal Sinus	ea		2	3
30643	Cannula, Frontal Sinus, Full Curved	ea			1
30644	Cannula, Frontal Sinus, Lesser Curved	ea			1
30650	Cannula, Intravenous	ea	24	18	36
30705	Carrier, Sponge, Child	ea			8
30730–08	Case, Bone, Operating, 110 Volt, 60 cycle, AC	ea			1
30770	Case, Diagnostic, Eye, Ear, Nose and Throat	ea		1	2
30900	Case, Trial Lenses	ea		1	1
30920	Catheter, Eustachian, Size 1	ea		1	2
30930	Catheter, Eustachian, Size 2	ea		2	3
30940	Catheter, Eustachian, Size 3	ea		1	2
30990	Catheter, Urethral, X-ray, 5F, Olivary	ea	6	4	8
31000	Catheter, Urethral, X-ray, 6F, Olivary	ea		4	8
31010	Catheter, Urethral, X-ray, 5F, Whistle	ea	6	4	4
31020	Catheter, Urethral, X-ray, 6F, Whistle	ea		4	4
31070	Catheter, Urethral, Rubber, 14F	ea	6	6	12
31080	Catheter, Urethral, Rubber, 16F	ea	34	12	24
31090	Catheter, Urethral, Rubber, 18F	ea	6	12	24
31100	Catheter, Urethral, Rubber, 22F	ea		6	12
31110	Catheter, Urethral, Rubber, 26F	ea		5	10
31120	Catheter, Urethral, Rubber, Guide	ea	6	2	2
31130	Catheter, Urethral, Rubber, Self-retaining	ea	6	4	6
31133	Catheter, Urethral, Rubber, Self-retaining, 4-Wing, Malecot, 32F	ea	6	3	6
31140	Catheter, Urethral, Woven, 14F	ea		2	2
31160	Catheter, Urethral, Woven, 18F	ea		3	3
31170	Catheter, Urethral, Woven, 20F	ea		2	2

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
31190	Chisel, Bone, Bevel, 6 MM	ea		1	2
31200	Chisel, Bone, Bevel, 12 MM	ea		4	8
31210	Chisel, Bone, Bevel, 18 MM	ea		2	4
31220	Chisel, Bone, Osteotome, 6 MM	ea		2	4
31230	Chisel, Bone, Osteotome, 12 MM	ea		2	4
31240	Chisel, Bone, Osteotome, 18 MM	ea		2	4
31260	Chisel, Nasal, Straight	ea		1	2
31270	Clamp, Bone-Plating, Large	ea		4	8
31277	Clamp, Harelip, Ivy	pr		1	2
31280	Clamp, Hemorrhoidal	ea		1	1
31287	Clamp, Intestinal, Anastomosis, 3-Blade	ea			1
31295	Clamp, Pylorus, 8-inch	ea		2	2
31330	Curette, Chalazion, Medium	ea		2	2
31340	Curette, Ear	ea		2	4
31380	Curette, Ethmoid	set		2	3
31410	Curette, Mastoid, Buck, Size 1	ea		1	1
31420	Curette, Mastoid, Buck, Size 3	ea		2	8
31430	Curette, Mastoid, Richard, Size 1	ea		2	3
31440	Curette, Mastoid, Richard, Size 3	ea		2	3
31450	Curette, Mastoid, Richard, Size 5	ea		3	5
31460	Curette, Mastoid, Whiting, Size 2	ea		2	2
31470	Curette, Mastoid, Whiting, Size 4	ea		1	2
31483	Curette, Sinus	set		2	3
31510	Curette, Uterine, Sharp, Size 2	ea		1	1
31515	Curette, Uterine, Sharp, Size 4	ea	1	1	1
31560	Cystoscope, 24F	ea	2	1	1
31570–11	Cystoscope, Lamp-51: For Use with item 31560	ea	6	12	24
31575	Cysto-Urethroscope	ea		1	1
31577	Cysto-Urethroscope Lamp: For use with item 31575	ea		12	12
31580	Cystotome, Eye	ea		2	3
31590	Depressor, Tongue, Bosworth	ea		4	6
31600	Dermatome Set, Complete	set			1
31602	Dermatome Set, Blade For	ea			1
31604	Dermatome Set, Brush	ea			1
31606	Dermatome Set, Special Cement	½ gal			1
31620	Dilator, Lachrymal	ea		1	1
31630	Dilator, Trachea	ea		2	3
31640	Dilator, Urethral, 12F	ea	1	1	1
31650	Dilator, Urethral, 14F	ea		1	1
31660	Dilator, Urethral, 16F	ea	1	1	1
31670	Dilator, Urethral, 18F	ea		1	1
31680	Dilator, Urethral, 22F	ea	1	1	1
31690	Dilator, Urethral, 26F	ea		1	1
31710	Dilator, Uterine	ea		1	1
31720	Dilator, Uterine, 6 in set	set			1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
31730	Director, Grooved	ea		13	26
31735	Director, Grooved, with Myrtle leaf	ea		4	8
31760	Dissector, Tonsil	ea		4	6
31790	Drill, Bone	set		2	4
31800	Drill, Bone, Extra Drills	set	2	2	4
31820	Drill, Cranial, Brace For	ea		1	2
31822	Drill, Cranial, Burr, Enlarging, Adson-Rogers.	ea		2	4
31826	Drill, Cranial, Burr, Perforating, Adson-Rogers.	ea		2	4
31827	Electrode, Fulgurating, Bugbee, Flexible, 6F.	ea			1
31828	Electrode, Fulgurating, McCarthy, Flexible, Set 9F.	ea			1
31831	Electrode, Coagulation, McCarthy Type, Rigid, 9F.	ea		1	1
31832	Electrode, Cutting Loop, 28F	ea			1
31840	Elevator, Nasal, Blunt	ea		2	4
31850	Elevator, Nasal, Sharp	ea		2	4
31860	Elevator, Periosteal, Blunt	ea		1	2
31870	Elevator, Periosteal, Double-Ended	ea		1	2
31880	Elevator, Periosteal, Sharp	ea		6	14
31910	Esophagoscope, 9 MM by 45 CM, Adult's.	ea			1
31930	Evacuator, Cystoscopic, Ellick Type	ea		1	1
31933	Evacuator, Cystoscopic, Toomey Type.	ea		1	1
31955	Extension Apparatus, Kirschner, Hand Drill Type.	ea	2	1	2
31958–05	Extension Apparatus, Drills, Wire, 9-inch by .063-inch diameter.	doz		1	2
31958–07	Extension Apparatus, Drills, Wire, 9-inch by .045-inch diameter.	doz	3	2	4
31958–09	Extension Apparatus, Drills, Wire, 9-inch by .037-inch diameter.	doz		1	2
31958–11	Extension Apparatus, Drills, Wire, 12-inch by .063-inch diameter.	doz		1	1
31958–13	Extension Apparatus, Drills, Wire, 12-inch by .045-inch diameter.	doz		1	2
31958–15	Extension Apparatus, Drills, Wire, 12-inch by .037-inch diameter.	doz		1	1
31959–05	Extension Apparatus, Traction Bow, No. 121B, Medium.	ea	12	16	32
31959–06	Extension Apparatus Traction Bow, No. 121A, Large.	ea	12	16	32
31960	Extension Apparatus, Steinmann	ea	5		
31960–10	Extension Apparatus, Steinmann, New Type.	ea		8	20

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
31965-04	Extension Apparatus, Steinmann, New Type.	ea	10	15	30
31965-06	Extension Apparatus, Steinmann, Pin, 6½-inch by ⅛-inch.	ea	15	15	30
31965-08	Extension Apparatus, Steinmann, Pin, 8-inch by 5/32-inch.	ea	10	15	30
31970	Filiform, 4F	ea	12	8	12
31980	Filiform, 5F	ea	12	8	12
31990	Filiform, Whalebone, Size 6	ea	12	8	12
32010	Forceps, Bone-Cutting, Straight	ea		2	3
32020	Forceps, Bone-Cutting, Straight, Heavy.	ea		3	6
32030	Forceps, Bone-Holding, 10-inch	ea		2	4
32035	Forceps, Bone-Holding, 12-inch	ea		2	4
32036	Forceps, Bone-Holding, 10½-inch, Lambotte.	ea		2	4
32037	Forceps, Bone-Holding, 8½-inch, Ferguson.	ea		3	6
32040	Forceps, Bone, Rongeur, 7-inch	ea	2	1	2
32045	Forceps, Bone, Rongeur, 8¼-inch, Angular, Bacon.	ea		1	2
32060	Forceps, Bone, Rongeur, 10¼-inch	ea		2	4
32070	Forceps, Bone, Rongeur, Cranial, Devilbiss.	ea		1	2
32075	Forceps, Bone, Rongeur, Cranial, Devilbiss, Blade, Long Bite.	ea		1	2
32076	Forceps, Bone, Rongeur, Cranial, Devilbiss, Blade, Short Bite.	ea		1	2
32080	Forceps, Bone, Rongeur, Cranial, Horsley.	ea		1	2
32172	Forceps, Capsule, Arruga	ea			1
32180	Forceps, Chalazion	ea		2	3
32183	Forceps, Cilia	ea		2	3
32185	Forceps, Clip Introducing, McKenzie	ea		2	4
32186	Forceps, Cystic Duct	ea		2	2
32187	Forceps, Cystoscopic, Alligator, Rigid.	ea		1	1
32189	Forceps, Cystoscopic, Ureteral, Stone Removing.	ea		1	1
32191	Forceps, Cystoscopic, Utility	ea		1	1
32193	Forceps, Cystoscopic, Visual, Hemostatic.	ea		1	1
32194	Forceps, Cystoscopic, Handle	ea		1	1
32196	Forceps, Cystoscopic, Rongeur, Flexible, 7F, Stem.	ea			1
32197	Forceps, Cystoscopic, Rongeur, Flexible, 11F, Stem.	ea		1	1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
32198	Forceps, Cystoscopic, Foreign Body, Flexible, 7F, Stem.	ea			1
32199	Forceps, Cystoscopic, Foreign Body, Flexible, 11F, Stem.	ea		1	1
32200	Forceps, Dressing, 5½-inch	ea		12	26
32210	Forceps, Dressing, 10-inch	ea		4	8
32230	Forceps, Dressing, Bozeman, Straight.	ea		1	1
32250	Forceps, Ear, Bayonet	ea		8	14
32270	Forceps, Fixation	ea		2	3
32280	Forceps, Fixation, without catch	ea		2	4
32286	Forceps, Gallstone, Rochester	ea		2	4
32288	Forceps, Hemostatic, Abbey	ea	72		
32290	Forceps, Hemostatic, Halstead, Mosquito, Straight.	ea		24	48
32300	Forceps, Hemostatic, Rankin-Kelley, Straight.	ea	108	240	480
32310	Forceps, Hemostatic, Rochester-Pean, Curved.	ea		216	444
32330	Forceps, Hemostatic, Rochester-Ochsner, 6¼-inch, Straight.	ea		96	194
32350	Forceps, Hysterectomy, Pean, Curved.	ea		24	48
32370	Forceps, Intestinal, Doyen, Curved	ea		8	16
32380	Forceps, Intestinal, Doyen, Straight.	ea		8	16
32385	Forceps, Intestinal, Judd-Allis, 7½-inch.	ea		12	24
32400	Forceps, Iris, Angular	ea		2	3
32420	Forceps, Iris, Straight	ea		2	3
32430	Forceps, Kidney, Curved	ea		8	16
32448	Forceps, Laryngeal, Grasping	ea			1
32454	Forceps, Laryngeal, Tissue Specimen	ea			1
32500	Forceps, Mastoid, Rongeur, Bane	ea		5	9
32520	Forceps, Mastoid, Rongeur, Kerrison, Large.	ea		2	3
32535	Forceps, Meat	ea			1
32540	Forceps, Nasal, Asch	ea		2	3
32550	Forceps, Nasal, Bruening Type, Large.	ea		2	3
32580	Forceps, Nasal, Jansen-Middleton	ea		3	5
32590	Forceps, Nasal, Polypus	ea		3	5
32625	Forceps, Pituitary, Bayonet-Shaped, Adson.	ea		1	2
32648	Forceps, Screw-Holding	ea		2	4
32657	Forceps, Side-Curved, Regular	ea		1	2
32670	Forceps, Sponge	ea		24	48
32678	Forceps, Tack & Pin	ea			1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
32691	Forceps, Throat	ea		1	2
32693	Forceps, Tissue, Specimen, Light (Bronchial).	ea			1
32695	Forceps, Tissue, Spring, 4½-inch	ea		8	16
32700	Forceps, Tissue, Spring, 5½-inch	ea		16	32
32702	Forceps, Tissue, Spring, 6-inch	ea		1	2
32710	Forceps, Tissue, Allis	ea		24	48
32712	Forceps, Tissue, 10-inch	ea		4	8
32725	Forceps, Tonsil, Hemostatic	ea		4	6
32740	Forceps, Tonsil, Angular	ea		2	2
32760	Forceps, Towel, 5¼-inch	ea		72	144
32770	Forceps, Trachoma, Knapp	ea			1
32810	Forceps, Vulsellum, Curved	ea	1	1	1
32850	Fork, Tuning, 5 in set	set		1	1
32855	Fraction Reduction Apparatus, Anatomic.	set			1
32860	Gag, Mouth	ea		2	3
32870	Gag, Mouth, Jennings, adult's	ea		2	6
32890	Gorget	ea		2	1
32900	Gouge, 6 MM	ea		2	3
32910	Gouge, 10 MM	ea		5	8
32924	Gouge, Mastoid, Schwartz, Size 1	ea		2	3
32925	Gouge, Mastoid, Schwartz, Size 2	ea		2	3
32926	Gouge, Mastoid, Andrews, Size 2	ea		1	2
32945	Hip Fracture Apparatus	set			1
32965	Holder, Needle, Collier	ea		2	4
32967	Holder, Needle, Hegar-Mayo	ea	54	24	48
33010	Hook, Dissecting, Adson, Blunt	ea		2	4
33020	Hook, Dura, Frazier	ea		2	4
33030	Hook, Iris	ea		2	3
33050	Hook, Strabismus, Medium	ea		2	4
33060	Hook, Strabismus, Small	ea		2	4
33070	Introducer, Needle	ea		3	6
33080	Intubation Set	ea			1
33090	Irrigator, Anterior Chamber	ea		2	3
33100	Keratome, Angular, Large	ea		2	3
33110	Keratome, Angular, Medium	ea		2	3
33120	Keratome, Angular, Small	ea		2	3
33140	Knife, Amputating, 6-inch Blade	ea		2	4
33160	Knife, Brain, 6⅜-inch Blade	ea		1	1
33170	Knife, Canaliculus	ea		2	3
33180	Knife, Cartilage	ea		2	2
33200	Knife, Cataract, Graefe, Size 1	ea		2	3
33210	Knife, Cataract, Graefe, Size 2	ea		2	3
33220	Knife, Cataract, Graefe, Size 3	ea		2	3
33250	Knife, Ear, Myringotome	ea		2	3
33252	Knife, Ear, Curved Blade	ea			2
33290	Knife, Eye, Needle, Medium	ea		2	4

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
33300	Knife, Eye, Needle, Small	ea		2	4
33320	Knife, Nasal, Septum	ea		1	1
33330	Knife, Nasal, Septum, Swivel	ea		1	1
33340	Knife, Nasal, Submucous, Half-Round.	ea		1	1
33350	Knife, Nasal, Submucous, Round	ea		1	1
33362	Knife, Operating, 2-inch Blade	ea		2	2
33365	Knife, Operating, Handle No. 3	ea		36	72
33369	Knife, Operating, Detachable Blade No. 10.	pkg		36	72
33370	Knife, Operating, Detachable Blade No. 11.	pkg		18	36
33371	Knife, Operating, Detachable Blade No. 12.	pkg		4	4
33373	Knife, Operating, Detachable Blade No. 15.	pkg		18	36
33377	Knife, Operating, Handle No. 4	ea		48	96
33381	Knife, Operating, Detachable Blade No. 20.	pkg		250	500
33385	Knife, Operating, Detachable Blade No. 21.	pkg		250	500
33400	Knife, Plaster	ea	2	24	48
33407	Knife, Skin Grafting, Large	set		1	2
33408	Knife, Skin Grafting, Blades for	box		1	2
33420	Knife, Tonsil	ea		2	2
33430	Knife, Tonsil Abscess	ea	2	2	3
33440	Lamp, Bronchoscopic	ea		12	24
33450	Laryngoscope, Adult	ea		1	2
33470	Lens, Eye Condensing	ea		1	2
33500	Mallet, Hardwood, with Seamless Metal Rings.	ea		1	3
33530	Mirror, Laryngeal, Size 1	ea		2	3
33550	Mirror, Laryngeal, Size 5	ea		2	3
33560	Needle, Aneurism, Cooper	ea		2	4
33575	Needle, Aneurism, Little	ea		1	2
33600	Needle, Post Mortem	ea		3	3
33620	Needle, Spinal Puncture, Corrosion Resisting Steel, 20 Gage.	ea	8	12	24
33622	Needle, Spinal Puncture, Corrosion Resisting Steel, 22 Gage.	ea	8	12	24
33624	Needle, Abdominal, 2⅞ inches, Straight.	pkg		24	48
33631	Needle, Catgut, Size 2, Half-Circle	pkg		10	20
33641	Needle, Catgut, Size 4, Half-Circle	pkg		4	60
33725	Needle, Eye, Size 2, Half-Circle	pkg	2	8	15
33735	Needle, Eye, Size 4, Half-Circle	pkg	2	4	6
33741	Needle, Eye, Size 1, Half-Circle	pkg		12	25
33751	Needle, Eye, Size 3, Half-Circle	pkg		4	6

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
33765	Needle, Eye, Size 2, ⅜-Circle	pkg	2	5	7
33775	Needle, Eye, Size 4, ⅜-Circle	pkg	2	2	3
33791	Needle, Intestinal, Size 2, Half-Circle.	pkg		4	6
33796	Needle, Intestinal, Size 3, Half-Circle.	pkg		12	24
33802	Needle, Intestinal, Size 4, Half-Circle.	pkg		4	6
33821	Needle, Intestinal, Size 1¾ inches, Straight.	pkg		12	24
33840	Needle, Pedicle, Large, Ivy	ea		4	6
33865	Needle, Skin Suture, 2½ inches	pkg		4	8
33931	Needle, Surgeon's Regular, Size 4, ⅜-Circle.	pkg		12	24
33950	Needle, Surgeon's Regular, Size 12, ⅜-Circle.	pkg		2	4
33961	Needle, Surgeon's Regular, Size 16, ⅜-Circle.	pkg		2	4
34021	Needle, Uterine, Size 7, Half-Circle	pkg		3	6
34029	Ophthalmoscope, Electric	ea		1	2
34033	Ophthalmoscope, Electric, Lamp	ea		6	12
34040	Otoscope, Electric	ea		1	2
34110–05	Plate, Bone, Size 0, Molybdenum	ea	3	6	12
34120–05	Plate, Bone, Size 1, Molybdenum	ea	3	6	12
34130–05	Plate, Bone, Size 2, Molybdenum	ea	3	6	12
34140–05	Plate, Bone, Size 3, Molybdenum	ea	3	6	12
34150–05	Plate, Bone, Size 4, Molybdenum	ea	3	6	12
34160–05	Plate, Bone, Size 5, Molybdenum	ea	3	6	12
34170–05	Plate, Bone, Size 6½, Molybdenum	ea	3	6	12
34180–05	Plate, Bone, Size 7, Molybdenum	ea	3	6	12
34190–05	Plate, Bone, Size 8, Molybdenum	ea	3	6	12
34220	Plate, Lid	ea		1	2
34240	Probe, 8-inch	ea		6	11
34260	Probe, Bullet	ea		12	24
34270	Probe, Lachrymal	set		2	3
34280	Probe, Salivary Duct	ea		1	2
34320	Procto-Sigmoidoscope, Electric	ea		1	2
34330	Procto-Sigmoidoscope, Electric, Lamp	ea		3	6
34340	Rachiotome	ea		1	1
34342	Rasp, Antrum, Cutting	ea		2	3
34345	Rasp, Bone, Coarse	ea		1	2
34347	Rasp, Bone, Fine	ea		1	2
34360	Rasp, Frontal Sinus, or Antrum	ea		2	3
34362	Rasp and Trocar, Antrum, Wiener-Pierce.	ea		2	3
34363	Rasp, Nasal	ea		1	2
34370	Raspatory, Mastoid and Sinus	ea		1	2
34372	Raspatory, Rib, Left	ea		1	2

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
34374	Raspatory, Rib, Right	ea		1	2
34380	Repositor, Iris	ea		2	3
34390	Repositor and Probe, Iris	ea		2	3
34405	Retinoscope, Electric	ea		1	1
34410	Retractor, Abdominal, Double-ended	nest		4	8
34430	Retractor, Abdominal, Self-Retaining.	ea		4	8
34434	Retractor, Abdominal, Single-ended, 1½ by 12⅝ inches.	ea		2	4
34435	Retractor, Abdominal, Single-ended, 1 by 12½ inches.	ea		4	8
34436	Retractor, Abdominal, Single-ended, 2 by 12½ inches.	ea		4	8
34437	Retractor, Abdominal, Single-ended, Mayo.	ea		1	2
34440	Retractor, Abdominal, Suprapubic	ea		2	2
34450	Retractor, Brain	ea		3	6
34455	Retractor, Brain, Frazier, Set of 3	set		1	2
34457	Retractor, Brain, Self-Retaining, Weitlaner, 6¼-inch, 3 by 4 Prongs.	ea		1	4
34470	Retractor, Eye, Desmarres, Medium	ea		1	3
34480	Retractor, Eye, Fisher	ea		4	6
34490	Retractor, Laminectomy	ea		2	4
34500	Retractor, Mastoid	ea		3	6
34505	Retractor, Muscle, 4 Blunt Prongs	ea		4	20
34525	Retractor, Tibia, Large	ea		4	8
34530	Retractor, Tissue, 4 Sharp Prongs	ea		10	20
34540	Retractor, Tissue, Nested	ea		4	8
34550	Retractor, Tonsil	ea		2	2
34560	Retractor, Trachea, 1-Prong	ea		2	4
34570	Retractor, Trachea, 3-Prong	ea		4	8
34580	Retractor, Vein	ea		4	8
34590	Saw, Amputating	ea		3	5
34600	Saw, Stille-Gigli, Wire, 12-inch	ea	3	12	24
34610	Saw, Stille-Gigli, Wire, 20-inch	ea	3	12	24
34623	Saw, Gigli, Bailey Conductor	ea		2	2
34630	Saw, Gigli, Handle	ea	2	2	4
34640	Saw, Metacarpal	ea		2	4
34647	Saw, Nasal, Bayonet Shaped, Left	ea		1	2
34648	Saw, Nasal, Bayonet Shaped, Right	ea		1	2
34650	Saw, Plaster	ea		2	4
34680	Scissors, Bandage	ea	12	32	66
34695	Scissors, Dissecting, Curved, 6¾-inch	ea		30	60
34697	Scissors, Dissecting, Curved, 9-inch	ea		4	8
34705	Scissors, Dissecting, Straight, 6¾-inch.	ea		30	60
34720	Scissors, Double-Blunt, 6½-inch	ea		16	32
34750	Scissors, 1 point Sharp, 5½-inch	ea		48	100

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
34755	Scissors, Enterotomy	ea		1	1
34760	Scissors, Enucleation	ea		2	3
34780	Scissors, Iris, Angular	ea		2	3
34790	Scissors, Iris, Full-Curved	ea		9	14
34800	Scissors, Nasal, Angular	ea		2	3
34813	Scissors, Surgical, Dean, No. 9	ea		3	4
34820	Scissors, Tenotomy	ea		2	4
34830	Scissors, Tonsil	ea		2	3
34850	Scoop, Gall Bladder	ea		2	4
34860–05	Screw, Bone, ⅜-inch, Molybdenum	ea	6	24	48
34862–05	Screw, Bone, ½-inch, Molybdenum	ea	6	24	48
34864–05	Screw, Bone, ⅝-inch, Molybdenum	ea	6	24	48
34866–05	Screw, Bone, ¾-inch, Molybdenum	ea	6	24	48
34868–05	Screw, Bone, ⅞-inch, Molybdenum	ea	6	36	72
34870–05	Screw, Bone, 1-inch, Molybdenum	ea	6	36	72
34872–05	Screw, Bone, 1⅛-inch, Molybdenum	ea		36	72
34874–05	Screw, Bone, 1¼-inch, Molybdenum	ea	6	36	72
34876–05	Screw, Bone, 1⅜-inch, Molybdenum	ea	6	36	72
34878–05	Screw, Bone, 1½-inch, Molybdenum	ea	6	36	72
34880–05	Screw, Bone, 1⅝-inch, Molybdenum	ea	6	36	72
34890	Screw Driver, Lane	ea		2	4
34900	Screw Driver, Bone	ea		2	4
34920	Shears, Plaster Paris	ea	2	2	42
34932	Shears, Rib, 13½-inch	ea		1	2
34935	Skid, Bone (Lever)	ea		2	4
34940	Snare, Nasal	ea		2	3
34955	Snare, Tonsil	ea		1	1
34960	Snare, Wire, No. 28 Stubs Gage	spool		1	1
34970	Snare, Wire, No. 27 Stubs Gage	spool		2	3
34980	Snare, Wire, No. 24 Stubs Gage	bundle		8	12
34990	Sound, 18F	ea		1	2
35000	Sound, 20F	ea		1	2
35010	Sound, 22F	ea		1	2
35020	Sound, 24F	ea		1	2
35030	Sound, 26F	ea		1	2
35040	Sound, 28F	ea		1	2
35110	Spatula, Brain, 7-inch	ea		2	4
35130	Spatula, Eye, 5¾-inch	ea		2	3
35150	Speculum, Ear	set		2	4
35165	Speculum, Esophageal	ea			1
35180	Speculum, Eye, Nonmagnetic	ea		1	2
35200	Speculum, Eye	ea		2	3
35210	Speculum, Nasal	ea		4	8
35230	Speculum, Nasal, Killian	ea		3	5
35250	Speculum, Nasal, Myles	ea			1
35260	Speculum, Nasal, Septal	ea		1	2
35280	Speculum, Vaginal, Bivalve, Graves	ea	1	2	2
35320	Speculum, Vaginal, Weighted	ea		1	1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
35330	Spoon, Lens, Daviel	ea		2	3
35340	Spoon, Lens, Wire Loop	ea		2	3
35350	Spreader, Rib	ea		2	4
35360	Spud, Eye	ea		2	3
35395	Tongs, Skull Traction	ea		3	6
35396	Tongs, Skull Traction, Drill Points For.	pr		4	8
35400	Tonometer	ea			1
35405	Tourniquet, Lobectomy	ea	2		2
35440	Trocar, Antrum	ea		2	3
35467	Trocar, Emmett, 24F	ea		1	2
35470	Trocar, Gall Bladder	ea		1	2
35477	Tube, Abdominal, Suction	ea		4	8
35485	Tube, Aspirating, 50 CM	ea		1	2
35508	Tube, Aspirating, Open-End, Warning Stop at 40 CM.	ea		1	2
35510	Tube, Breathing, Large	ea	6	11	25
35515	Tube, Breathing, Small	ea	2	3	4
35520	Tube, Miller-Abbot, Double Lumen, Complete.	ea	3	5	10
35538	Tube, Suction, with Obturator, Adson.	ea		2	4
35560	Tube, Trachea, Size 3	ea		1	1
35580	Tube, Trachea, Size 5	ea	6	4	6
35585	Tube, Trachea, Size 6	ea		1	2
36030	Adapter, for Tubing	ea	15	20	48
36032	Anesthesia Apparatus, Endotracheal, Complete.	ea		1	4
36034	Anesthesia Apparatus, Endotracheal, Catheter, Magill, 32F.	ea		1	1
36036	Anesthesia Apparatus, Endotracheal, Catheter, Magill, 38F.	ea		1	1
36094	Apparatus, Blood Transfusion, Indirect, Needle, Donor.	ea		4	6
36099	Apparatus, Blood Transfusion, Indirect, Filtering, Device.	ea		8	22
36106	Apparatus, Drainage and Suction, Wangensteen Type, Modified.	ea	6	4	12
36110	Applicator, Wood	carton	12	25	50
36120	Atomizer, Set of 4	set		1	2
36160	Bag, Politzer	ea		1	1
36163	Bag, Wet Dressing, Arm	ea		15	25
36165	Bag, Wet Dressing, Leg	ea		15	25
36170	Balkan Frame	ea		30	60
36195	Balkan Frame, Rope, 5/32-inch	yd	100	150	250
36215	Battery Box	ea	6	3	6
36260–10	Cardiograph, Portable, Battery-Electric.	ea			1

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
36266	Cardiograph, Galvanometer Lamp	ea			12
36267	Cardiograph Paper	roll			25
36275	Case, Spectacle Fitting and Repair	ea	1	1	1
36277	Case, Spectacle Fitting and Repair, for Glasses worn under Gas Mask.	ea	1	1	1
36280	Cautery Cord, Heavy	ea	2	1	2
36285	Cautery Cord, Regular	ea		1	2
36290	Cautery, Eye, Burner No. 51	ea		1	1
36300	Cautery, Eye, Burner No. 52	ea		1	1
36310	Cautery, Eye, Burner No. 53	ea		1	1
36320	Cautery, Eye, Burner No. 54	ea		1	1
36330	Cautery, Eye, Burner No. 55	ea		1	1
36340	Cautery, Eye, Handle	ea		1	1
36350	Cautery, Handle	ea		1	1
36380	Cautery, Large Burner, Knifepoint	ea	2	2	2
36432–08	Cautery, Transformer, Hospital Size, 110V, 60 Cycle, AC.	ea	1	1	1
36440	Cement, Rubber, 1 oz	ea		4	6
36460	Chimney	ea		1	1
36510	Clamp, Tubing	ea		6	12
36520	Clipper, Hair	ea		4	8
36614	Cord, Elastic; For Traction	yd	25		
36617–10	Cord, Electric, For Diagnostic Appliances, ESI, Boehm-Pilling.	ea	2	1	4
36620	Cot, Finger	doz		2	4
36622	Cotton, Thread, No. 120	spool	6	24	48
36624	Cotton, Thread, No. 80	spool	6	24	48
36626	Cotton, Thread, No. 40	spool	4	24	48
36627	Cotton, Thread, Quilting	spool		12	24
36630	Crutches	pr		40	100
36640	Crutch, Rubber Tip for, Nonskid Type, ¾-inch.	ea		80	200
36670	Cushion, Surgical	ea		3	5
36680	Depressor, Tongue	carton	25	144	250
36690	Drum, Test	ea		2	3
36703	Electrosurgical Unit, Portable	ea	1		1
36710	Eye Shade, Double	ea		24	48
36720	Eye Shade, Single	ea		12	24
36722	Eye Spheres (Prosthesis Balls), 16 MM.	ea		12	24
36740	Gloves, Autopsy	pr	3	6	10
36810	Gloves, Medium, Size 6½	pr	100	48	132
36820	Gloves, Medium, Size 7	pr	60	48	132
36830	Gloves, Medium, Size 7½	pr	200	84	212
36840	Gloves, Medium, Size 8	pr	60	84	212
36850	Gloves, Medium, Size 8½	pr		20	36
36870	Hammer, Percussion	ea		2	3
36890	Headband, Leather Strap	ea		3	5

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
36910	Headband, Mirror	ea		3	5
36940	Headlight	ea		3	6
36950	Headlight, Lamp To Fit Item 36940	ea		3	6
36960	Inhaler, Yankauer	ea	6	12	24
36990	Intravenous Solutions, Reservoir	ea	6	8	18
37040	Irrigator Tips	pr	10	36	48
37050	Irrigator Tubing	ea		2	4
37055	Kit, Suction	ea	6		
37090	Loupe, Binocular	ea		2	3
37110–15	Magnet, Eye, Small AC–DC, 110V, 60 Cycle, AC.	ea		1	1
37115	Mandible Fracture Kit	ea			1
37120	Manometer, Spinal	ea	1	2	3
37127	Mask Type Oxygen Therapy Outfit, Mask, Nasal.	ea		1	3
37128	Mask Type Oxygen Therapy Outfit, Mask, Oronasal.	ea		1	3
37162	Pneumothorax Apparatus	ea			1
37165	Pneumothorax Apparatus, Holder, Needle.	ea			2
37166	Pneumothorax Apparatus, Needle, Aspirating.	doz			2
37167	Pneumothorax Apparatus, Needle, Initial Puncture.	ea			6
37168	Pneumothorax Apparatus, Needle, Refill.	ea			12
37175	Rack, Clip Holding, with Cover, McKenzie.	ea		1	2
37200	Razor, Safety	ea		12	24
37210	Razor, Safety, Blades	pkg		72	144
37230	Reflector	ea			1
37265	Resuscitator and Inhalator	ea			1
37275–08	Rheostat, Lamp Socket Type, 110 Volt, 60 Cycle, AC.	ea	2	2	5
37355–08	Sharpener, Needle, Electric, 110 Volt, 60 Cycle, AC.	ea			1
37370	Sphygmomanometer, Aneroid	ea	16	8	24
37380	Sphygmomanometer, Mercurial	ea		4	8
37381	Sphygmomanometer Bulb	ea		2	4
37382	Sphygmomanometer Compression Bag.	ea		2	4
37383	Sphygmomanometer, Sleeve for	ea		1	2
37384	Sphygmomanometer, Valve for	ea		2	4
37388	Splint, Basswood, in lengths	ft	600	75	150
37390	Splint, Cabot	ea	40	12	25
37455	Splint Strap	ea	100	15	24
37480	Splint, Thomas, Arm, Hinged	ea	65	20	25
37500	Splint, Army, Leg, Half-Ring	ea	65	20	40

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
37505	Splint, Army, Leg, Half-Ring, Pierson's Attachment.	ea		12	25
37515	Splint Support and Foot Rest	ea	130	40	80
37540	Splint, Wire Ladder	ea	50	25	40
37545	Splint, Wrist, Cock-Up	ea	15	12	25
37580	Splint Accessory-Buckle for 1½-inch Webbing.	ea		50	72
37590	Splint Accessory-Buckle for 2-inch Webbing.	ea	50	15	20
37600	Splint Accessory-Felt, Firm Wool, White.	lin. ft		6	12
37610	Splint Accessory, Felt, Saddle, Gray	yd	5		
37615	Splint Accessory, Asbestos-Felt, Soft, Gray.	yd	5	20	30
37690	Splint Accessory, Webbing, 1-inch	yd		15	20
37700	Splint Accessory, Webbing, 1½-inch	yd		50	100
37710	Splint Accessory, Webbing, 2-inch	yd	24	15	20
37715	Sprayer, Hand, Continuous	ea	3	6	12
37730	Stethoscope	ea	12	18	36
37735	Stethoscope, Blood Pressure, Bracelet Type.	ea	8	2	4
37740	Stethoscope, Tubing	ft	36	18	36
37747	Stopcock, 1-way	ea		1	2
37750–08	Suction Apparatus, Portable, Electric 110 Volt, 60 Cycle, AC.	ea	2	2	3
37760	Support, Pelvic	ea	1	1	2
37762	Suture, Catgut, Chromic, Size 00 with 1¾-inch Straight Non-Traumatic Needle Affixed.	pkg	5	6	10
37764	Suture, Catgut, Chromic, Size 00 with 1⅛-inch Half-Circle, Non-Traumatic Needle Affixed.	pkg	5	6	10
37770	Suture, Catgut, Chromic, Size 00	tube	25	80	160
37780	Suture, Catgut, Chromic, Size 0	tube	1, 200	380	760
37790	Suture, Catgut, Chromic, Size 1	tube	1, 200	400	800
37800	Suture, Catgut, Chromic, Size 2	tube	600	30	60
37840	Suture, Catgut, Plain, Size 00	tube	25	130	260
37850	Suture, Catgut, Plain, Size 0	tube	1, 200	165	330
37860	Suture, Catgut, Plain, Size 1	tube	1, 200	300	600
37870	Suture, Catgut, Plain, Size 2	tube	600	40	80
37881	Suture, Eye, Catgut, Plain, Size 4–0, Single-Armed, with Size 3, ⅜-Circle, Cutting Edge, Non-Traumatic Needle Affixed.	pkg	5	6	10
37882	Suture, Eye, Catgut, Plain, Size 000, Single-Armed with Size 4, ⅜-Circle, Cutting Edge, Non-Traumatic Needle Affixed.	pkg	5	6	10

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
37883	Suture, Eye, Catgut, Mild Chromic, Size 4–0, Single-Armed, with Size 3, ⅜-Circle, Cutting Edge Non-Traumatic Needle Affixed.	pkg	5	6	10
37884	Suture, Eye, Catgut, Plain, Size 000, Double-Armed with Size 4, ⅜-Circle, Cutting Edge, Non-Traumatic Needle Affixed.	pkg	5	6	10
37885	Suture, Eye, Catgut, Mild Chromic, Size 4–0, Double-Armed, with Size 3, ⅜-Circle, Cutting Edge, Non-Traumatic Needle Affixed.	pkg	2		
37886	Suture, Eye, Silk, Size 6–0, Single-Armed, with Size 3, Half-Circle, Cutting Edge, Non-Traumatic Needle Affixed.	pkg	2	3	6
37887	Suture, Eye, Silk, Size 6–0, Single-Armed with Size 3, ⅜-Circle, Cutting Edge, Non-Traumatic Needle Affixed.	pkg	2	3	6
37888	Suture, Eye, Silk, Size 6–0, Double-Armed with Size 3, ⅜-Circle Cutting Edge, Non-Traumatic Needle Affixed.	pkg	2	3	6
37889	Suture, Eye, Silk, Size 4–0, Double-Armed, with Size 3, ⅜-Circle, Cutting Edge, Non-Traumatic Needle Affixed.	pkg	2	3	6
37890	Suture, Eye, Silk, Braided, Non-Capillary, Size 6–0.	spool	1	3	6
37891	Suture, Eye, Silk, Braided, Non-Capillary, Size 4–0.	spool	1	3	6
37963	Suture, Nylon, Braided, Size 5–0	spool		3	6
37969	Suture, Silk, Braided, Non-Capillary, Size 000.	spool	30	12	24
37971	Suture, Silk, Braided, Non-Capillary, Size 00.	spool	60	24	48
37973	Suture, Silk, Braided, Non-Capillary, Size 0.	spool	60	24	48
37975	Suture, Silk, Braided, Non-Capillary, Size 1.	spool	60	24	48
37978	Suture, Silk, Braided, Non-Capillary, Size 2.	spool	60	24	48
37988	Suture, Silk, Braided, Non-Capillary, Size 4.	spool	60	12	24
37995	Suture, Silk, Dermal, Coarse	pkg	15	60	110
37996	Suture, Silk, Dermal, Medium	pkg	30	72	160
38050	Suture, Silkworm Gut, Coarse	coil		12	25

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
38057	Suture, Silkworm Gut, Medium	coil		4	10
38130	Syringe, Ear, 2 oz	ea		4	6
38170	Syringe, Glass, 1 oz	ea		12	25
38430	Syringe, Luer, 1 cc	ea	10	40	65
38440	Syringe, Luer, 2 cc	ea	50	106	210
38450	Syringe, Luer, 10 cc	ea	30	106	210
38460	Syringe, Luer, 30 cc	ea	15	24	58
38462	Syringe, Luer, 30 cc, Adapter	ea			8
38465	Syringe, Luer-Lok, 5 cc	ea			24
38470	Syringe, Luer, Needle, 25-Gage, ¼-inch Cannula.	doz	2		
38480	Syringe, Luer, Needle, 25-Gage, ½-inch Cannula.	doz	12	24	37
38490	Syringe, Luer, Needle, 23-Gage, ¾-inch Cannula.	doz	4	15	25
38500	Syringe, Luer, Needle, 22-Gage, 1-inch Cannula.	doz	4	18	36
38503	Syringe, Luer, Needle, 22-Gage, 3-inch Cannula.	doz		6	12
38505	Syringe, Luer, Needle, 20-Gage, 1½-inch Cannula.	doz	2	15	24
38510	Syringe, Luer, Needle, 19-Gage, 1¾-inch Cannula.	doz	6	25	35
38520	Syringe, Luer, Needle, 17-Gage, 3-inch Cannula	doz	2	10	19
38530	Syringe, Luer, Needle, 15-Gage, 3-inch Cannula.	doz	2	5	8
38550–10	Syringe, Luer, Needle, Wire, 33-Gage, 2-inch.	bundle	25	8	16
38550–15	Syringe, Luer, Needle, Wire, 30-Gage, 4-inch.	bundle	25	6	11
38550–20	Syringe, Luer, Needle, Wire, 28-Gage, 2¾-inch.	bundle		3	5
38602	Syringe, Tonsil, Laryngeal and Dental.	ea		11	11
38603	Syringe, Tonsil, Laryngeal and Dental Needle for, Straight.	ea		12	18
38604	Syringe, Tonsil, Laryngeal and Dental, Needle for, Curved.	ea		4	6
38605	Syringe, Laryngeal, Curved Cannula.	ea		2	3
38606	Syringe, Lachrymal, Cannulae	set		2	3
38610	Syringe, Urethral Prophylaxis	ea	20	50	100
38630	Tape, Cotton	roll	9	12	20
38670	Transluminator (Lamp, Diagnostic)	ea		1	1
38680	Transluminator Lamp	ea		4	6
38685	Tube, Colon	ea	12	15	24
38690	Tube, Diagnostic, Ear	ea		2	3

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 3—Continued				
38705–05	Tube, Duodenal, Levin's, Size 12	ea		3	6
38705–07	Tube, Duodenal, Levin's, Size 14	ea		6	12
38705–09	Tube, Duodenal, Levin's, Size 16	ea	10	3	6
38710	Tube, Duodenal, Rehfuss	ea		2	4
38720	Tube, Murphy Drip	ea	15	10	24
38730	Tube, Nasal, Feeding, 22F	ea		6	12
38750	Tube, Stomach	ea	6	4	8
38753	Tubing, Drainage, ⅜-inch	ea	10	15	15
38755	Tubing, Drainage, ⅝-inch	ea	10	10	15
38760	Tubing, Rubber, ⅛-inch	ft	10	100	200
38780	Tubing, Rubber, ¼-inch	ft		232	464
38790	Tubing, Rubber, ½-inch	ft		40	100
38792	Tubing, Rubber, Latex, 3/16-inch	ft	200	25	50
38793	Tubing, Rubber, Latex, 3/16-inch	ft	20	25	50
38800	Vision Test Set	ea		1	1
38890	Wire, Corrosion-Resisting Steel, 0.009-inch.	spool	2	4	7
38900	Wire, Corrosion-Resisting Steel, 0.014-inch.	spool	2	4	7
38910	Wire, Corrosion-Resisting Steel, 0.028-inch.	coil	2	2	4
38930	Wire, Silver, Preformed Clips	pkg		10	24
	Class 4				
40020	Adapter (Y-Tube)	ea	9	6	6
40090	Asbestos Mat	ea		2	2
40110–28	Autoclave, Laboratory, Horizontal: For use with Leaded Gasoline.	ea		1	1
40130	Balance, Analytical	ea		1	1
40160	Balance, Analytical, Rest	ea		2	2
40170	Balance, Analytical, Weights	set		1	1
40175	Balance Pans	pr		4	4
40200–08	Basal Metabolism Apparatus, 110V, 60 cycle, AC.	set			1
40210	Basal Metabolism Apparatus, Charts: for Use with Item 40200–08.	box			1
40300	Basket, Culture Tube	ea		30	30
40310	Beads, Glass	lb		1	1
40315	Beaker, 50 cc	ea		8	8
40330	Beaker, 250 cc	ea		12	12
40340	Beaker, 600 cc	ea		6	
40350	Beaker, 1,000 cc	ea			10
40420	Block, Embedding	ea			5
40450	Bottle, Aspirator	ea		6	6
40460	Bottle, Balsam, 45 cc	ea			3
40480	Bottle, Dropping, 60 cc	ea		24	36
40485	Bottle, Infusion, Kelly	ea	5	8	15
40540	Bottle, Narrow Mouth, 4 liter	ea	6	4	6

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 4—Continued				
40560	Bottle, Narrow Mouth, 5-gal. Carboy.	ea		1	2, 000
40562	Bottle, Screw Neck with Cap, Vial Type, 9 cc.	ea	20	1, 200	
40563	Bottle, Screw Neck, with Cap, Vial Type, 22 cc.	ea	6	400	650
40564	Bottle, Screw Neck, with Cap, Vial Type, 120 cc.	ea	6	100	200
40565	Bottle, Screw Neck, with Cap, Vial Type, 240 cc.	ea	2	8	12
40566	Bottle, Screw Neck, with Cap, Wide Mouth, 60 cc.	ea	4	60	120
40567	Bottle, Screw Neck, with Cap, Wide Mouth, 240 cc.	ea		10	50
40610	Bottle, Reagent, Complete Set	set		1	1
40900	Box, Paraffin Embedding	set			10
40920	Brush, Burette	ea		4	2
40930	Brush, Camel Hair, 1-inch	ea		2	2
40940	Brush, Flask	ea		2	4
40950	Brush, Test Tube, 1⅛-inch	ea		12	24
40955	Brush, Test Tube, ½-inch	ea		2	4
40980	Bulb, Rubber, 1½-inch	ea			6
41000	Burette, 50 cc	ea		2	4
41010	Burette, Automatic, 50 cc	ea			2
41012	Burette, Micro	ea		2	2
41210	Carbon Dioxide Apparatus	ea			1
41220	Carbon Dioxide Cylinder (Laboratory), Filled.	ea			2
41240	Case, Mailing, Culture	ea		12	12
41250	Case, Mailing, Typhoid	ea		12	12
41260	Case, Mailing, Wassermann	ea		12	12
41270	Case, Mailing, Water	ea		12	12
41390–08	Centrifuge, Electric, Small, 110 V., 60 Cycle, AC.	ea		1	1
41400	Centrifuge, Hand, Single-Speed	ea		1	1
41420	Centrifuge, Tube, Graduated, 15 cc	ea		50	50
41430	Centrifuge, Tube, Ungraduated, 15 cc.	ea		144	144
41440	Centrifuge, Tube, Ungraduated, 50 cc.	ea		36	36
41750	Clamp, Adjustable	ea		8	8
41760	Clamp, Extension, 8-inch	ea		3	4
41770	Clamp, Extension, 11-inch	ea		4	4
41780	Clamp, Extension, Holder	ea		6	8
41800	Clamp, Mohr's Pinchcock	ea		12	12
41804	Clamp, Pinchcock, Heavy	ea	2	2	3
41806	Clamp, Pinchcock, Regular	ea	2	2	3

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 4—Continued				
41808	Clamp, Shut-Off, Screw Adjustment.	ea	3	2	3
41810	Clamp, Test Tube	ea		4	4
41820	Clock, Interval Timer	ea	1	4	5
41840	Colorimeter, Duboscq	ea	1	1	2
41850	Colorimeter, Cup	ea		2	2
41852	Colorimeter, Plunger	pr		2	2
41870	Condenser, Liebig	ea		2	2
41890	Cover Glass, 22 MM Square	box		12	24
41900	Cover Glass, 22 by 40 MM	box		1	1
41920	Crucible, Gooch	ea		2	4
41930	Crucible Holder, Walter	ea		1	2
41970	Cylinder, 10 cc	ea		2	2
41990	Cylinder, 50 cc	ea		3	4
42000	Cylinder, 100 cc	ea		4	6
42030	Cylinder, 1,000 cc	ea		3	4
42060	Cylinder, Mixing, 100 cc	ea		4	4
42080	Desiccator, Scheibler	ea		1	1
42100	Diamond	ea			2
42120	Dish, Evaporating, Glass, 125 cc	ea		6	10
42130	Dish, Evaporating, Glass, 275 cc	ea		4	6
42139	Dish, Evaporating, Platinum, 100 cc.	ea			1
42140	Dish, Evaporating, Porcelain, 70 cc.	ea			4
42150	Dish, Evaporating, Porcelain, 250 cc.	ea		4	6
42160	Dish, Evaporating, Porcelain, 1,285 cc.	ea		2	2
42200	Dish, Petri	pr		400	600
42222	Dish, Petri, Large	pr		100	200
42230	Dish, Petri, Holder	ea		6	6
42240	Dish, Stender, 26 MM High	ea			4
42250	Dish, Stender, 90 MM High	ea			4
42260–35	Distilling Apparatus, 2 gal. per hour, for use with leaded gasoline.	ea	1	1	2
42265	Distilling Apparatus, with Graham condenser.	ea		2	2
42290	Extraction Apparatus	ea			2
42300	Extraction Thimble, Double Thickness.	carton			1
42375	Filter, Seitz, Manteufel, Size 6	ea		2	2
42377	Filter Discs, Seitz, Germicide	pkg		2	2
42390	Flask, Distillation, 250 cc	ea		2	2
42410	Flask, Distillation, 1,000 cc	ea		2	2
42420	Flask, Erlenmeyer, 50 cc	ea	10	20	20
42430	Flask, Erlenmeyer, 125 cc	ea	6		
42440	Flask, Erlenmeyer, 250 cc	ea		20	40

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 4—Continued				
42460	Flask, Erlenmeyer, 1,000 cc	ea		12	24
42480	Flask, Filtering, 500 cc	ea			2
42490	Flask, Filtering, 1,000 cc	ea			2
42550	Flask, Volumetric, 50 cc	ea		1	2
42560	Flask, Volumetric, 100 cc	ea		2	2
42580	Flask, Volumetric, 500 cc	ea		2	2
42607	Funnel, Fritted, 350 cc	ea			2
42608	Funnel, Fritted, 600 cc	ea			2
42610	Funnel, Glass, 50 MM	ea	2	4	6
42630	Funnel, Glass, 125 MM	ea		6	6
42670	Funnel, Glass, Ribbed, 4¾-inch	ea		3	4
42680	Funnel, Glass, Ribbed, 7¼-inch	ea		2	2
42690	Funnel, Separatory, Cylindrical, 60 cc	ea			2
42710	Funnel, Separatory, Squibb, 250 cc	ea			2
42720	Funnel, Separatory, Squibb, 500 cc	ea			2
42770	Hemacytometer, complete	ea		8	8
42790	Hemacytometer, Cover Glass	ea		24	24
42800	Hemacytometer, Pipette, Red Corpuscle.	ea		50	50
42810	Hemacytometer, Pipette, White Corpuscle.	ea		75	100
42811	Hematocrit tube, Wintrobe	ea	12	12	36
42812	Hemoglobinometer	ea	2	1	2
42840	Hemoglobinometer, Tallqvist	ea		3	6
42850	Holder, Needle, Dissection	ea		2	2
42860	Holder, Needle, Kolle	ea		8	8
42870	Hydrometer, For Liquids Heavier than Water.	ea			1
42880	Hydrometer, For Liquids Lighter than Water.	ea			1
42923–28	Incubator, Bacteriological, 37½° and 50° C, for use with leaded gasoline.	ea		1	2
43010	Jar, Coplin	ea		12	12
43070	Jar, Specimen, 1 pt	ea		8	12
43080	Jar, Specimen, 1 qt	ea		3	6
43120	Label, Micro	book		4	4
43130	Magnifier	ea		1	1
43150	Microscope	ea		5	6
43170	Microscope, Dark Field Apparatus	ea		1	1
43175	Microscope, Dark Field Apparatus, 6–8 volt Lamp.	ea		4	4
43275	Microscope Lamp	ea		4	7
43277	Microscope Lamp, 100-watt Bulb	ea		12	12
43360	Microtome	ea			1
43370	Microtome, Clinical	ea			1
43390	Microtome, Knife, for Clinical Microtome.	ea			2

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 4—Continued				
43400	Microtome, Knife, for Minot Microtome.	ea			2
43410	Microtome, Knife Back	ea			2
43420	Microtome, Knife Handle	ea			2
43450	Microtome, Knife Strop, Coarse	ea			1
43570–05	Oven, Pathological, 110 V, 60 cycle, AC.	ea			1
43580	Paper, Filter, 90 MM	pkg		5	10
43590	Paper, Filter, 150 MM	pkg	2	10	10
43600	Paper, Filter, 180 MM	pkg		6	6
43610	Paper, Filter, 250 MM	pkg		6	6
43615	Paper, Filter, 380 MM	pkg		12	12
43620	Paper, Filter, for Blotting Micro Slides.	pkg		3	4
43630	Paper, Filter, No. 40, 110 MM	pkg		2	2
43640	Paper, Filter, No. 42, 90 MM	pkg		6	6
43650	Paper, Lens	pkg		6	6
43656	Pipette, Kahn, 0.25 cc	ea		24	24
43660	Pipette, Ostwald, 1 cc	ea		12	12
43670	Pipette, Ostwald, 2 cc	ea		12	18
43680	Pipette, Ostwald, 3 cc	ea		6	8
43690	Pipette, Ostwald, 5 cc	ea		12	12
43700	Pipette, Ostwald, 10 cc	ea		4	6
43710	Pipette, Serological, 1/10 cc	ea			10
43720	Pipette, Serological, 2/10 cc	ea			24
43730	Pipette, Serological, 1 cc	ea		200	300
43740	Pipette, Serological, 5 cc	ea			50
43750	Pipette, Serological, 10 cc	ea		25	50
43780	Pipette, Volumetric, 5 cc	ea			12
43790	Pipette, Volumetric, 10 cc	ea		10	10
43800	Pipette, Volumetric, 25 cc	ea			6
43805	Pipette, Volumetric, 100 cc	ea			2
43810	Pipette Box	ea			8
43830	Pump, Filter	ea		2	4
43831	Pump, Filter, Coupling	ea		2	4
43832	Pump, Filter, Airejector type, 5½ inches long.	ea		2	2
43834	Pump, Filter, Airejector type, Coupling with Rubber Grip.	ea		2	2
43836	Pump, Filter, Airejector Type, Coupling with Threaded Grip.	ea		2	2
43850	Ring, Suberite	ea			2
43890	Rod, Glass, Assorted, 1 lb	pkg		1	2
43920	Section Lifter	ea			1
43925	Shaking Apparatus, Kahn	ea		1	
43927–05	Shaking Apparatus, Kahn, 110 V, 60 cycle, AC.	ea			1
43950	Slide, Micro, 75 by 25 MM	carton		20	30

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 4—Continued				
43960	Slide, Micro, with one Spherical Concavity.	ea		12	20
43980	Slide, Micro, Box	ea		10	35
43990	Slide, Micro, Case, Mailing	doz		1	5
44000	Spoon, Metal	carton		2	2
44010	Sterilizer, Arnold	ea		1	1
44030–28	Sterilizer, Hot Air, Medium; for use with Leaded Gasoline.	ea		1	2
44160	Stopper, Rubber, Solid, No. 4	ea	10	20	20
44170	Stopper, Rubber, Solid, No. 6	ea	10	20	20
44190	Stopper, Rubber, Solid, No. 8	ea	10	12	20
44230	Support Stand, 6½ by 9 inches	ea		4	4
44240	Support Stand, 6½ by 11 inches	ea		2	4
44250	Support Stand, Ring, 3-inch	ea		2	4
44260	Support Stand, Ring, 4-inch	ea		4	6
44300	Test Tube, Aeration	ea		200	200
44310	Test Tube, Chemical	ea		125	200
44330	Test Tube, Fermentation, Large	ea		100	100
44345	Test Tube, Filling Shield	ea		2	2
44350	Test Tube, Folin	ea		24	36
44360	Test Tube, Ignition	ea		12	24
44364	Test Tube (Kahn Precipitin)	ea		1, 200	2, 000
44385	Test Tube, Screw Cap	ea		200	300
44390	Test Tube, Wassermann	ea			400
44405	Test Tube Support, (Kahn Precipitin).	ea		10	20
44410	Test Tube Support, Wassermann Rack	ea		4	12
44430	Thermometer, Chemical, Minus 10° to Plus 110°C.	ea		3	4
44450	Thermometer, Chemical, Minus 10° to Plus 360°C.	ea		3	4
44460	Thermometer, Chemical Precision, Minus 10° to Plus 105°C.	ea			2
44470	Thermometer, Incubator	ea		4	4
44480	Tongs, Crucible	ea		2	2
44510	Tripod, Iron	ea		6	6
44520	Tube, Color Comparison, 50 cc, Nessler, with 50 cc Mark, 210 MM, 6 in set.	set		2	2
44540	Tube, Color Comparison, Support	ea		1	1
44545	Tube, Digestion, Folinwu, NPN	ea		10	20
44550	Tube, Drying, 140 MM	ea			4
44580	Tubing, Glass, 6 MM	ft	20	75	120
44590	Tubing, Glass, 10 MM	ft	20	40	80
44610	Tubing, Rubber, for Gas	ft		50	60
44630	Tubing, Rubber, Pressure, 3/16-inch	ft			6
44640	Tubing, Rubber, Special, 3/16-inch	ft			30

Item No.	Item	Unit	Amount		
			Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 4—Continued				
44700	Urinometer	ea		6	12
44710	Vial, 2 Dram	ea		1,000	1,000
44740	Watch Glass	set			12
44770	Water Bath Inoculating	ea		2	3
44790–08	Water Bath, Serological, Inactivating, 110 V, 60 cycle, AC.	ea		1	1
44800–08	Water Bath, Serological, Wassermann, 110 V, 60 cycle, AC.	ea		1	1
44890	Wire, Platinum, No. 22	inch		50	25
44910	Wire Gauze	ea		12	12

Item no.	Item	Unit	Station hospital (500-bed)	General hospital (1,000-bed)
	*Class 5**			
50020	Alloy, 1 oz	bottle	18	30
50025	Alloy-Mercury, Measuring Device	ea	2	4
50080	Arbor, Emery	ea	1	1
50090	Arbor, Emery, Band	box	1	1
50110	Articulator, Crown and Bridge	ea	1	1
50130	Articulator, Gysi	ea	1	1
50140	Balance, Portable	ea	1	1
50160	Base Plate	box	6	6
50180	Blower, Chip	ea	3	5
50190	Blower, Chip, Bulb	ea	2	2
50220	Blowpipe Outfit	ea	1	1
50240	Bottle, Office, Preparation	ea	6	10
50260	Bowl, 4¾-Inch	ea	2	2
50300	Brush, Inlay	ea	2	2
50350	Bur, No. 2, Angle Handpiece	pkg	12	18
50360	Bur, No. 4, Angle Handpiece	pkg	16	24
50370	Bur, No. 6, Angle Handpiece	pkg	24	36
50390	Bur, No. 9, Angle Handpiece	pkg	12	18
50430	Bur, No. 35, Angle Handpiece	pkg	24	36
50440	Bur, No. 37, Angle Handpiece	pkg	24	36
50450	Bur, No. 39, Angle Handpiece	pkg	12	18
50520	Bur, No. 557, Angle Handpiece	pkg	24	36
50550	Bur, No. 560, Angle Handpiece	pkg	24	36
50570	Bur, No. 700, Angle Handpiece	pkg	24	36
50590	Bur, No. 702, Angle Handpiece	pkg	24	36
50610	Bur, No. ½, Straight Handpiece	pkg	12	18
50630	Bur, No. 2, Straight Handpiece	pkg	12	18
50640	Bur, No. 4, Straight Handpiece	pkg	12	18
50650	Bur, No. 6, Straight Handpiece	pkg	12	18
50670	Bur, No. 9, Straight Handpiece	pkg	8	12
50710	Bur, No. 35, Straight Handpiece	pkg	12	18

*Note: Evacuation hospitals were not issued any Class 5 Items.

Item no.	Item	Unit	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 5—Continued			
50720	Bur, No. 37, Straight Handpiece	pkg	12	18
50820	Bur, No. 557, Straight Handpiece	pkg	12	18
50830	Bur, No. 558, Straight Handpiece	pkg	12	18
50870	Bur, No. 700, Straight Handpiece	pkg	12	18
50890	Bur, No. 702, Straight Handpiece	pkg	12	18
51070	Burnisher, Stellite, "1–2"	ea	1	2
51127	Carrier, Amalgam, No. 5	ea	3	5
51185	Cellophane, Sheets	pkg	2	2
51220	Cement, Permanent, Pearl Gray	box	4	6
51230	Cement, Permanent, Yellow	box	4	6
51240	Cement, Silicate, Case	ea	1	2
51250	Cement, Silicate, Liquid, Caulk	bottle	8	12
51265	Cement, Silicate, Shade 20	bottle		2
51275	Cement, Silicate, Shade 21	bottle	2	4
51285	Cement, Silicate, Shade 22	bottle	2	4
51295	Cement, Silicate, Shade 23	bottle	2	4
51305	Cement, Silicate, Shade 24	bottle	2	4
51315	Cement, Silicate, Shade 25	bottle	1	2
51385	Cement, Silicate, Measuring Device	ea	1	2
51390	Cement, Silicate, Shade Guide, Caulk	ea	1	2
51410	Cement, Silicate, Varnish, 1 oz	bottle	8	12
51422	Cement, Temporary, Anodyne	pkg	6	10
51425	Cervical Matrix	box	2	2
51460	Charcoal Block	ea	2	2
51487	Chisel, Osseous, Stout, No. 1	ea		1
51495	Chisel, Osseous, Stout, No. 2	ea	1	1
51505	Chisel, Osseous, Stout, No. 3	ea		1
51540	Chisel, No. 3	ea	3	5
51550	Chisel, No. 5	ea	3	5
51580	Chisel, No. 48	ea	3	5
51585	Chisel, Wedelstaedt, No. 41	ea	3	5
51587	Chisel, Wedelstaedt, No. 42	ea	3	5
51660	Cleaners, No. 0	pkg	3	5
51680	Cleaners, No. 2	pkg	3	5
51710	Compound, Cake, ½-lb	box	8	12
51790	Cone, No. 3	ea	4	4
51810	Cotton Rolls, ⅜-Inch	box	15	25
51885	Crown Remover, Simplex	ea	1	1
51966	Curette, F. F. Molt, No. 2	ea	1	2
51967	Curette, F. F. Molt, No. 4	ea	1	2
51968	Curette, F. F. Molt, No. 9L	ea	1	2
51969	Curette, F. F. Molt, No. 10R	ea	1	2
52060	Dentimeter	ea	1	1
52070	Dentimeter, Iron Wire, ⅛-oz	spool	1	1
52072	Denture Base Material, Acrylic, Pink	pkg	8	2
52160	Disk, Carborundum, Knife Edge, ¾-Inch.	ea	40	60
52295	Disk, Metal Abrasive, ⅝-Inch	card	8	12
52300	Disk, Paper	box	4	6
52360	Disk, Vulcarbo, ¾-Inch	ea	80	120

Item no.	Item	Unit	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 5—Continued			
52465	Elevator, Stout "A"	ea	1	1
52497	Elevator, Winter, No. 1L	ea	1	1
52498	Elevator, Winter, No. 1R	ea	1	1
52500	Elevator, Winter, No. 122	ea	1	1
52510	Elevator, Winter, No. 123	ea	1	1
52560	Engine Oil, 1 oz	bottle	3	6
52570	Engine, Foot	ea	3	6
52590–10	Engine, Foot, Cord: 17-ft., 3-inch	ea	5	8
52610–05	Engine, Handpiece, Angle: Model P, Doriot, New.	ea	6	12
52630–05	Engine, Handpiece, Straight: Doriot	ea	5	9
52670	Excavator, No. 23	ea	6	10
52695	Excavator, No. 49	ea	6	10
52697	Excavator, No. 50	ea	6	10
52720	Excavator, No. 63	ea	6	10
52730	Excavator, No. 64	ea	6	10
52774	Excavator, No. 79	ea	6	10
52775	Excavator, No. 80	ea	6	10
52785	Excavator, No. 86	ea	6	10
52790	Explorer, No. 5	ea	9	15
52800	Explorer, No. 6	ea	9	15
52810	Explorer, No. 23	ea	9	15
*52876	File, Bone, Double-Ended	ea	1	1
52890	File, Gold, Half-Round	ea	1	1
52900	File, Gold, Round	ea	1	1
52980	File, Root, Canal, "B," No. 1	pkg	4	6
53000	File, Root, Canal, "B," No. 4	pkg	4	6
53040	File, Vulcanite, Double End	ea	1	1
53050	File, Vulcanite, Round	ea	1	1
53090	Finisher, No. 2	ea	2	2
53100	Finisher, No. 4	ea	2	2
53105	Flask, Ejector Type	ea	2	----------
53106	Flask, Ejector Type, Ejector for	ea	1	----------
53110	Floss, 100 Yards	spool	4	6
53130	Flux, Reducing	bottle	1	1
53135	Forceps, Bone, Rongeur, No. 5 S	ea	1	1
53170	Forceps, Rubber Dam, Punch	ea	1	1
53190	Forceps, No. 18R	ea	1	2
53200	Forceps, No. 18L	ea	1	2
53220	Forceps, No. 65	ea	1	2
53240	Forceps, No. 150A	ea	1	2
53250	Forceps, No. 151A	ea	1	2
53260	Forceps, No. 210	ea	----------	2
53262	Forceps, No. 215	ea	1	2
53264	Forceps, No. 217	ea	----------	2
53270	Frame, Heating	ea	2	2
53310	Gold, Casting, ¾ Crown, 2 Dwt	ingot	10	20
53320	Gold, Casting, Inlay, 2 Dwt	ingot	10	20
53350	Gold, Lingual Bar, Long, 2 Dwt	ea	10	16

*Note: If no stock is available of item 52876, substitute one (1) of either 52874 or 52875.

Item no.	Item	Unit	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 5—Continued			
53360	Gold, Lingual Bar, Medium, 1½ Dwt	ea	10	16
53370	Gold Plate, 22K, 5 Dwt	piece	2	2
53380	Gold Plate, 24K, 3 Dwt	piece	1	1
53390	Gold Solder, 16 K	Dwt	4	6
53400	Gold Solder, 18 K	Dwt	12	20
53410	Gold Solder, 20 K	Dwt	4	8
53430	Gold Wire, 14 Gage, Half-Round	4 Dwt	4	6
53460	Gold Wire, 18 Gage, Round	4 Dwt	4	6
53490	Gutta-Percha, Temporary, 1 oz	box	4	6
53580	Holder, Cotton	ea	3	5
53590	Holder, Mercury	ea	3	5
53600	Holder, Napkin	ea	3	5
53610	Holder, Nerve Broach	ea	3	5
53625	Impression Compound	carton	4	6
53628	Impression Compound, Trays	set	1	1
53660	Investment Compound, Crown and Bridge, 4 lb.	tin	2	2
53665	Investment, Inlay	tin	2	4
53667	Investment, Inlay, Control Powder	tin	1	2
53668	Investment, Inlay, Scale	ea	1	1
53730	Knife, Plaster, SSW–10	ea	1	1
53800	Lamp, Alcohol, SSW–1	ea	3	5
53810	Lamp, Alcohol, SSW–1, Wick	ea	6	10
53820	Lamp, Alcohol, Large	ea	1	1
53830	Lamp, Alcohol, Large, Wick	ea	2	2
53880–05	Lamp, Operating: Wall bracket type 110 V, 60 cycle AC.	ea	3	6
53910	Lancet, Volland, No. 2	ea	2	2
53920–09	Lathe, Electric: 110 V, 60 cycle, AC	ea	1	1
53950	Machine, Casting, Perfection	ea	1	1
53960	Machine, Casting, Asbestos Pad	box	2	2
53970	Machine, Casting, Crucible	ea	2	2
53990	Machine, Casting, Inlay Flask, 1¼-inch	ea	2	2
54000	Machine, Casting, Saddle and Bridge Flask, 1½ Inch.	ea	1	1
54005	Mallet, Metal	ea	1	1
54030	Mandrel, No. 303, For Angle Handpiece.	ea	12	18
54050	Mandrel, No. 303, For Straight Handpiece.	ea	12	18
54060	Mandrel, No. 303½, For Straight Handpiece.	ea	12	18
54070	Mandrel, Morgan-Maxfield, For Angle Handpiece.	ea	12	18
54080	Mandrel, Morgan-Maxfield, For Straight Handpiece.	ea	12	18
54120	Mechanical Dam	ea	3	5
54170	Mirror, Mouth	ea	12	20
54180–05	Mirror, Mouth, Plane Glass: Cone Socket.	ea	12	20

Item no.	Item	Unit	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 5—Continued			
54205	Mortar and Pestle, 3 CM	ea	3	5
54220	Paper, Articulating	book	8	10
54260	Pliers, No. 2, Dressing	ea	9	15
54270	Pliers, No. 17, Dressing	ea	9	15
54275	Pliers, No. 104	ea	1	1
54280	Pliers, No. 107, Round-Nose	ea	1	1
54310	Pliers, No. 136, Contouring	ea	1	1
54320	Pliers, No. 137, Contouring	ea	1	1
54325	Pliers, Clasp Bending, Jelenko	ea	1	1
54335	Pliers, Laboratory, Parallel Jaws	ea	1	1
54357	Pliers, Wire Nippers	ea	1	1
54360	Plugger, Black, No. 1	ea	3	5
54370	Plugger, Black, No. 3	ea	3	5
54400	Plugger, Ladmore, No. 3	ea	3	5
54440	Plugger, Root Canal, No. 1	ea	2	2
54450	Plugger, Root Canal, No. 3	ea	2	2
54500	Plugger, Woodson, No. 1	ea	6	10
54510	Plugger, Woodson, No. 2	ea	6	10
54520	Plugger, Woodson, No. 3	ea	6	10
54530	Point, Aseptic	box	4	6
54541	Point, No. 184, Angle Handpiece	ea	6	9
54550	Point, No. 186, Angle Handpiece	ea	6	9
54580	Point, No. 211, Angle Handpiece	ea	6	9
54600	Point, No. 226, Angle Handpiece	ea	6	9
54620	Point, No. 234, Angle Handpiece	ea	6	9
54630	Point, No. 241, Angle Handpiece	ea		9
54741	Point, No. 184, Straight Handpiece	ea	6	9
54750	Point, No. 186, Straight Handpiece	ea	6	9
54780	Point, No. 211, Straight Handpiece	ea	6	9
54800	Point, No. 226, Straight Handpiece	ea	6	9
54820	Point, No. 234, Straight Handpiece	ea	6	9
54830	Point, No. 241, Straight Handpiece	ea	6	9
54940	Point, Root Canal, No. 6	box	1	6
54950	Point, Root Canal, No. 8	box	1	6
55000	Polisher, Rubber Cup	box	8	12
55020	Pot, White	ea	4	6
55030	Press	ea	1	1
55060	Reamer, B–13	pkg	2	4
55070	Reamer, B–15	pkg	2	4
55090	Reamer, B–19	pkg	2	4
55190	Retainer, Matrix, No. 1	ea	3	5
55200	Retainer, Matrix, Bicuspid Band, Medium.	pkg	8	12
55210	Retainer, Matrix, Bicuspid Band, Narrow.	pkg	8	12
55220	Retainer, Matrix, Molar Band, Medium.	pkg	8	12
55230	Retainer, Matrix, Molar Band, Narrow.	pkg	8	12
55232	Retainer, Matrix, No. 9	ea	1	1

Item no.	Item	Unit	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 5—Continued			
55234	Retainer, Matrix, Bicuspid Band, No. 8.	pkg	3	4
55236	Retainer, Matrix, Molar Band, No. 8	pkg	3	4
55280	Rouge, 1 oz	stick	2	2
55350	Sandarac Varnish, 4 oz	bottle	2	2
55410	Scaler, No. 3	ea	6	10
55420	Scaler, No. 6	ea	6	10
55440	Scaler, No. 33	ea	3	5
55450	Scaler, No. 34	ea	3	5
55515	Scaler, Pyorrhea, Younger-Good, No. 3.	ea	3	5
55520	Scaler, Pyorrhea, Younger-Good, No. 4.	ea	3	5
55525	Scaler, Pyorrhea, Younger-Good, No. 15.	ea	3	5
55570	Separator, Elliott	ea	1	2
55593	Shears, Crown, Universal	ea	3	5
55595	Shears, Laboratory	ea	1	1
55620	Slab, Caulk-6	ea	5	9
55680	Spatula, Cement	ea	5	5
55690	Spatula, Plaster	ea	1	1
55700	Spatula, Stellite	ea	1	2
55710	Spatula, Wax	ea	1	1
55720	Spatula, Wax, SSW–31	ea	1	1
55760	Stick	bundle	4	6
55770	Stone, Artificial, 5 lb	tin	4	6
55780	Strip, Celluloid	box	8	12
55810	Strip, Polishing, Fine	box	8	12
55820	Strip, Polishing, Medium	box	8	12
55825	Strip, Polishing, Steel, Fine	pkg	4	6
55930	Syringe, Hypodermic, Cartridge Type, Complete.	ea	4	4
55934	Syringe, Hypodermic, Cartridge Type, Long Hub For.	ea	2	2
55936	Syringe, Hypodermic, Cartridge Type, Short Hub For.	ea	2	2
55938	Syringe, Hypodermic, Cartridge Type, Needle, Corrosion Resisting Steel, 25 Gage, 1-inch Cannula.	ea	60	80
55940	Syringe, Hypodermic, Cartridge Type, Needle, Corrosion Resisting Steel, 25 Gage, 1⅞-inch Cannula.	ea	60	80
55970	Syringe, Water	ea	3	6
55980	Syringe, Water, Bulb	ea	2	4
56125	Teeth, Mold, Guide	ea		1
56130–10	Teeth, Shade Guide: Trubyte, New Hue	ea	1	1
56145	Tin Foil, 0.001-Inch	roll	2	2
56160	Tongs, Soldering	ea	1	1
56220	Tray, Crown, and Bridge	ea	2	2
56270	Tray, Lower, BIS–18	ea	1	1

Item no.	Item	Unit	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 5—Continued			
56280	Tray, Lower, BIS–22	ea	1	1
56290	Tray, Lower, BIS–24	ea	1	1
56300	Tray, Lower, BIS–26	ea	1	1
56310	Tray, Lower, SSW–1	ea	1	1
56320	Tray, Lower, SSW–3	ea	1	1
56330	Tray, Lower, SSW–5	ea	1	1
56360	Tray, Upper, BIS–1	ea	1	1
56370	Tray, Upper, BIS–3	ea	1	1
56380	Tray, Upper, BIS–5	ea	1	1
56390	Tray, Upper, BIS–7	ea	1	1
56400	Tray, Upper, BIS–9	ea	1	1
56410	Tray, Upper, SSW–1	ea	1	1
56420	Tray, Upper, SSW–3	ea	1	1
56430	Tray, Upper, SSW–5	ea	1	1
56450	Trimmer, No. 26	ea	1	1
56460	Trimmer, No. 27	ea	1	1
56520	Tweezers, "B"	ea	1	1
56525	Tweezers, "K"	ea	1	1
56530	Tweezers, "L"	ea	1	1
56615	Vise	ea	1	1
56640	Vulcanizer, Flask, Compress	ea	1	1
56655	Vulcanizer, Flask, Tench-Donham, 22c	ea		2
56710	Wax Base Plate, ½-lb	box	6	8
56720	Wax, Boxing, 1-lb	box	4	4
56730	Wax, Casting	box	1	1
56740	Wax, Crown	box	2	2
56760	Wax, Inlay	box	2	4
56770	Wheel, Brush, No. 12	ea	1	1
56780	Wheel, Brush, No. 26	ea	1	1
56790	Wheel, Brush, No. 27	ea	1	1
56800	Wheel, Brush, No. 65	ea	1	1
56810	Wheel, Brush, No. 66	ea	1	1
56830	Wheel, No. 301	ea	12	24
56850	Wheel, No. 304	ea	12	24
56870	Wheel, No. 307	ea	12	24
56880	Wheel, No. 310	ea	12	24
56890	Wheel, 2-Inch, Coarse	ea	1	1
56900	Wheel, 2-Inch, Medium	ea	1	1
56910	Wheel, 3-Inch, Chamois	ea	1	1
56920	Wheel, 3-Inch, Cloth	ea	2	2
56940	Wheel, Felt, No. 2	ea	2	2
56957	Wheel, Flexible, Engine, Abrasive, ⅝-inch.	box		7
56960	Wire, Brass, Ligature	box	2	3

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 6				
60020	Apron, Lead	ea	2	2	4
60030	Bag, Sand, 8-Inch	ea	4	12	
60040	Bag, Sand, 18-Inch	ea	4	12	
60079	Caliper, Rule Type	ea	1	2	2
60080	Carrier, Dental Films	ea	2	6	6
60090	Cassette, 8-Inch	ea	2	6	8
60100	Cassette, 10-Inch	ea	2	6	6
60110	Cassette, 14-Inch	ea	2	8	12
60117	Cassette Changer, Stereoscopic, Upright, Magnetically controlled.	ea			1
60150	Film, X-ray, Dental	pkg	1	5	10
60170	Film, X-ray, 8-Inch	doz	6	18	144
60180	Film, X-ray, 10-Inch	doz	6	60	120
60190	Film, X-ray, 14-Inch	doz	6	120	240
60300	Gloves, Opaque	pr	3	2	3
60310	Goggles	pr	3	3	4
60330	Holder, Film Exposure, 8-inch	ea	6	18	24
60340	Holder, Film Exposure, 10-Inch	ea	6	18	24
60370	Holder, Film Development, 8-Inch	ea	6	18	24
60380	Holder, Film Development, 10-Inch	ea	6	18	24
60390	Holder, Film Development, 14-Inch	ea	6	24	36
60400	Illuminator, Radiographic	ea	1	3	3
60405	Illuminator, Radiographic, Fluorescent Tube for.	ea	2	8	12
60420	Ink, White, 2 oz	bottle	1	2	2
60450–05	Lamp, Bulb, Ruby, 110 Volt, 60 cycle, AC.	ea	2	4	4
60470	Lead, Sheet	sq. ft	6	12	12
60480	Letters, Lead	set	1	5	10
60485	Light, Safe, Ceiling type	ea		3	3
60486	Light, Safe, Ceiling type, Bulb	ea		6	6
60490	Light, Safe, Wall Type	ea	1	1	1
60495–05	Light, Safe, Lamp Bulb: 110 Volt, 60 Cycle, AC.	ea	2	6	6
60500	Localization, Eye, Complete with Headrest.	ea		1	1
60510	Localization, Eye, Chart	doz		5	5
60880	Machine, X-ray, dental, shockproof, complete.	set			1
60900	Machine, X-ray, Portable	ea		1	1
61100	Mount, Dental Film	doz		2	6
61102	Numbers, Lead, "0"	envelope	1	3	3
61103	Numbers, Lead, "1"	envelope	1	3	3
61104	Numbers, Lead, "2"	envelope	1	3	3
61105	Numbers, Lead, "3"	envelope	1	3	3
61106	Numbers, Lead, "4"	envelope	1	3	3
61107	Numbers, Lead, "5"	envelope	1	3	3
61108	Numbers, Lead, "6"	envelope	1	3	3
61109	Numbers, Lead, "7"	envelope	1	3	3

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 6—Continued				
61111	Numbers, Lead, "8"	envelope	1	3	3
61112	Numbers, Lead, "9"	envelope	1	3	3
61120	Oil, Transformer	gal	1	1	5
61200	Pencil, Dermatographic	ea	6	6	12
61240	Preserver, Negative, 14-Inch	pkg	5	50	50
61275	Ruler, Transparent	ea	1	3	4
61360	Stereoscope, Complete	ea			1
61580	Table, Urological	ea		1	1
61670	Tank, Developing, Dental Film	ea			1
61679	Thermometer, Dark Room	ea	2	6	6
	Class 7				
70000	Medical Department Supply Catalog, Complete.	ea	2	6	8
70001	Medical Department Supply Catalog, Class 1.	ea		15	25
70002	Medical Department Supply Catalog, Class 2.	ea		15	25
70003	Medical Department Supply Catalog, Class 3.	ea		15	25
70004	Medical Department Supply Catalog, Class 4.	ea		15	25
70005	Medical Department Supply Catalog, Class 5.	ea		15	25
70006	Medical Department Supply Catalog, Class 6.	ea		15	25
70007	Medical Department Supply Catalog, Class 7.	ea		15	25
70008	Medical Department Supply Catalog, Class 8.	ea		15	25
70009	Medical Department Supply Catalog, Class 9.	ea		15	25
70010	Back Rest	ea		25	50
70430	Chair, Invalid	ea		10	20
70460	Chair, Specialists	ea		1	1
70603	Holder, Card	ea		500	1,000
70604	Holder, Chart	ea		500	1,000
70740	Safe, Small	ea		1	1
70810	Stand, Bowl, Immersion	ea		5	8
70950	Table, Instrument, Adjustable	ea		6	9
70980	Table, Operating	ea		4	6
70992	Table, Operating, Headrest, Cerebellar.	ea		1	2
70994	Table, Orthopedic, Portable	ea		1	1
71005	Tray, Card Index	ea		10	20
71020	Baker, Electric, Portable	ea		4	6
71030–05	Bath, Arm, 110 Volt, 60 Cycle, AC	ea		1	1
71040–05	Bath, Leg, 110 Volt, 60 Cycle, AC	ea		1	1
71232	Lamp, Therapeutic, Infra-Red, Small, Element Type.	ea		2	3

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 7—Continued				
71234	Lamp, Therapeutic, Infra-Red, Small, Element for.	ea		6	6
71260–05	Lamp, Therapeutic, Mercury Arc, Air-Cooled, Portable: 110 Volt, 60 Cycle, AC.	ea		1	1
71320–05	Sinusoidal Machine, Portable; For Galvanic Faradic, and rapid Sinusoidal Currents: 110 Volt, 60 Cycle, AC.	ea		1	1
71390	Spectacles, Ultra-Violet	ea		2	4
71510	Bag, Laundry, Large	ea	1	20	40
71520	Bag, Laundry, Small	ea	200	25	50
71600–05	Gown, Operating: Large	ea	120	50	100
71600–10	Gown, Operating: Medium	ea	200	125	250
71600–15	Gown, Operating: Small	ea	50	50	100
71605	Mattress, Cotton	ea		525	1,050
71620	Mattress Cover for Felt Mattress	ea		600	1,260
71628	Pad for Operating and Examining Table.	ea		7	15
*71640–05	Pajama Coat, Winter: Large	ea		500	950
*71640–10	Pajama Coat, Winter: Medium	ea		1,200	2,218
*71660–05	Pajama Trousers, Winter: Large	ea		500	950
*71660–10	Pajama Trousers, Winter: Medium	ea		1,200	2,218
71670	Pillow, Feather	ea		500	1,000
71690	Pillow Case	ea		2,000	4,000
71710–05	Robe, Bath: Large	ea	25	100	200
71710–10	Robe, Bath: Medium	ea	50	200	300
71710–15	Robe, Bath: Small	ea			100
71720	Sheet	ea		3,500	7,000
71760–05	Suit, Operating, Coat: Large	ea	10	16	30
71760–10	Suit, Operating, Coat: Medium	ea	20	36	70
71762–05	Suit, Operating, Trousers: Large	ea	10	16	30
71762–10	Suit, Operating, Trousers: Medium	ea	20	36	70
71770	Towel, Bath	ea		1,800	3,000
71780	Towel, Hand	ea		5,000	
72010	Apron, Cook's	ea	65	120	240
72030	Beater, Egg, Wire Whip	ea		3	6
72170	Bowl, Soup, Enamel Ware	ea		530	1,060
72240	Cap, Cook's	ea		50	100
72300–05	Cart, Food, Drinkwater, Complete, 1 Large Cabinet.	ea	6		16
72300–10	Cart, Food, Drinkwater, Complete, Two Small Cabinets.	ea		8	
72450	Cleaver, approx. 10-inch	ea		4	8
72630	Dipper, 1 pt	ea		6	12
72880	Fork, Flesh, 20-inch	ea		10	32
72890	Fork, Table	ea		500	1,000
72970	Grater, Large	ea		7	12

*NOTE: Summer pajamas in identical quantities will be issued to tropical and subtropical theaters.

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 7—Continued				
73090	Knife, Butcher, approx. 12-inch	ea		10	18
73120	Knife, Paring	ea	6	12	18
73123	Knife, Potato Peeler	ea	10	15	30
73130	Knife, Sabatier, Heavy	ea		6	12
73160	Knife, Table	ea		500	1,000
73180	Ladle, Small	ea		18	36
73200	Masher, Potato	ea		4	6
73315	Opener, Can, Large	ea		2	2
73320	Opener, Can, Small	ea	3	8	12
73400	Pan, Dish, 36-qt	ea		15	30
73480	Pick, Ice	ea		6	8
73540	Pitcher, 3-qt	ea	5	32	60
73630	Pot, Coffee, 11½-qt	ea	4	15	30
73670	Pot, Stock, 14-qt	ea		6	12
73680	Pot, Stock, 24-qt	ea		3	6
73690	Pot, Stock, 24-qt., with Faucet and Strainer.	ea		3	6
73700	Pot, Stock, 40-qt	ea		3	6
73755–85	Refrigerator, Mechanical, Kerosene, 8-cu. ft.	ea	1	2	3
73780	Rolling Pin	ea	2	4	6
73840	Scale, Dietetic	ea		1	2
73860	Scale, Meat Beam	ea		1	1
73870	Scoop, Large	ea		4	6
73890	Shaker, Pepper	ea	15	20	40
73910	Shaker, Salt	ea	15	20	40
73990	Slicer, Meat, Small	ea		1	1
74010	Spoon, Basting, 20-inch	ea		18	30
74030	Spoon, Table	ea		120	240
74035	Spoon, Table, Medium (Dessert)	ea		500	1,000
74060	Squeezer, Lemon	ea		6	12
74100	Strainer, 3-inch	ea		10	18
74120	Strainer, Chinese	ea		4	4
74230	Tongs, Ice	ea		2	3
74240	Towel, Dish	ea		120	240
74260	Tray, Butler's	ea		14	25
74270	Tray, Serving	ea		150	300
74290	Turner, Cake	ea		8	12
74510	Broom, Corn	ea		288	
74540	Brush, Bedpan	ea		12	
74560	Brush, Hand	ea	75	100	200
74570	Brush, Paint, 2-inch	ea		5	10
74590	Brush, Scrub	ea	25	25	50
74620	Bucket	ea	20	50	100
74680	Lye	can	20	96	144
74700	Mop Handle	ea	10	40	72
74710	Mop Head	ea	20	120	200
74760	Pan, Dust	ea		12	20
74870	Shovel	ea		3	5

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 7—Continued				
74890	Soap, Laundry	bar	100	1, 200	2, 000
74900	Soap, Scouring, Coarse	bar	100	800	1, 000
74910	Soap, Scouring Powder	can		110	200
74930	Soap, White Floating	bar	200	1, 000	2, 000
74935	Steel Wool	pkg	5		
75040	Bag, Paper, 5-lb	pkg		12	24
75045	Bag, Paper, 3-lb	pkg		12	24
75110	Binder, 1-inch Ring	ea		6	6
75120	Binder, Medical History	ea		1	1
75150	Book, Blank, 8 Vo	ea	30	45	90
75155	Book, Memo, 3½ by 6 inches	ea		15	18
75160	Book, Blank, Ledger	ea	9	30	60
75200	Book, Stenographer's	ea		24	36
75210	Book, Prescription Filing	ea		1	2
75230	Brush, Mucilage or Paste, ½-inch	ea		10	12
75240	Brush, Typewriter	ea		10	12
75250	Can, Oil, Typewriter	ea		4	6
75260	Card, Index, 3 by 5 inches, Ruled	pkg		60	80
75280	Card, Index, 5 by 8 inches, Ruled	pkg		35	48
75290	Card, Guide, 3 by 5 inches, Alphabetical.	set		8	12
75300	Card, Guide, 3 by 5 inches	set		6	8
75310	Card, Guide, 5 by 8 inches, Alphabetical.	set		6	10
75320	Card, Guide, 5 by 8 inches	set		4	6
75360	Clip, Paper, Gem No. 1	box	3	20	40
75370	Clip, Paper, Ideal	box		15	30
75400–10	Envelope, No. 189, Ungummed	25		125	250
75400–10	Envelope No. 93, Ungummed	25		24	50
75495	Fastener, Paper, Acco No. 12	box		25	50
75550	File, Shannon, Large	ea		12	25
75560	File, Shannon, Small	ea		8	15
75580	Fingerprint Ink	tube	1	2	2
75590	Fingerprint Plate	ea	1	1	1
76600	Fingerprint Roller	ea	1	1	1
75620	Folder, File, Cap Size	box		10	15
75625	Folder, File, Letter Size	box	1	15	30
75630	Glue, ¼-Pint	can	3	8	10
75720	Ink, Stamp Pad, Black	bottle		1	1
75725	Ink, Stamp Pad, Red	bottle		1	1
75727	Ink, Writing Fluid, Black	bottle		2	4
75728	Ink, Writing Fluid, Red	bottle		2	2
75730	Inkstand	ea		24	30
75750	Label, 1 5/16 by 1 11/16 inches	box		20	24
75760	Label, 2 13/16 by 1 9/16 inches	box		10	20
75780–15	Label, Poison, Small	book	2	3	5
75790–15	Label, Veal, Small	book	3	10	14
75815	Mimeograph, Hand	ea		1	1
75820	Mimeograph, Ink, Black	lb		3	4

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 7—Continued				
75830	Mimeograph Pad	ea		4	4
75840	Mimeograph, Stencil	quire		25	48
75850	Mimeotype, Correction Fluid	oz		12	25
75870	Mucilage, 4 oz	bottle		14	20
75900	Oil, Typewriter	2 oz		2	4
75940	Pad, Prescription	ea	10	50	100
75950	Pad, Memorandum, 3 by 5 inches	ea		100	200
75960	Pad, Memorandum, 6 by 9 inches	ea	18	50	100
75980	Pad, Stamp, Dry	ea		8	10
76020	Paper, Blotting, 3 by 9½ inches	piece	12	250	500
76030	Paper, Carbon, Black, 8 by 13 inches.	box		4	6
76040	Paper, Carbon, Black, 8 by 10½ inches.	box	1	20	40
76060	Paper, Mimeograph, 8 by 10½ inches	ream		9	18
76070	Paper, Mimeograph, 8 by 13 inches	ream		2	3
76080	Paper, Typewriter, Bond, 8 by 13 inches.	ream		4	8
76090	Paper, Typewriter, Manifold, 8 by 13 inches.	ream		8	16
76100	Paper, Typewriter, Bond, 8 by 10½ inches.	ream	5	75	100
76110	Paper, Typewriter, Manifold, 8 by 10½ inches.	ream	8	175	250
76120	Paper, Wrapping, Dispensary, Blue	quire		3	3
76130	Paper, Wrapping, Dispensary, White	quire		3	3
76150	Paper, Wrapping, Folded	quire	3		
76160	Paper, Wrapping, Roll	roll		2	2
76200	Pen, Steel, Ballpoint	gross		1	1
76210	Pen, Steel, Spencerian	gross		1	1
76220	Pen, Steel, Falcon	gross		1	1
76230	Pen, Steel, Stub	gross		1	1
76240	Pencil	doz	5	25	50
76250	Pencil, Blue	ea		8	12
76270	Pencil, Indelible	ea	50	12	12
76280	Pencil, Red	ea		8	12
76290	Pencil, Wax, Blue	ea	6	15	20
76300	Pencil, Wax, Red	ea	6	15	20
76310	Penholder	ea	6	30	60
76330	Punch, Paper	ea		6	8
76370	Ribbon, Typewriter	ea	2	15	30
76380	Ribbon, Typewriter, Black and Red	ea		3	6
76400	Ruler, 18-inch	ea		5	8
76440	Shears, Office	ea	3	3	5
76480	Stamp, Dating	ea		3	6
76500	Stamp, Outfit	set		2	2
76510	Stamp, Penalty	ea		1	2
76570	Stencil Set	set		1	1
76580	Tack, Thumb	box	2	4	8

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 7—Continued				
76600	Tag, Shipping, Paper	bundle		10	20
76610	Tape, Gummed Paper, ⅞-inch	roll		10	15
76620	Tape, Office, Red	spool		3	4
76630	Twine, Cotton	ball		6	10
76640	Twine, Jute, Coarse	ball	3		
76650	Twine, Jute, Fine	ball	3		
76680–10	Typewriter, 10-inch	ea		12	18
76680–14	Typewriter, 14-inch	ea		1	1
76700	Wax, Sealing	stick		2	2
77010	Apron, Rubberized	ea	12	18	36
77020	Atomizer, Hand	ea	4	5	10
77025	Atomizer, Hand, Rubber bulb	ea			10
77050	Bag, Hot water	ea	60	50	100
77070	Bag, Ice	ea		25	50
77080	Balance, Prescription	ea	2	1	1
77110	Basin, Hand	ea	100	25	50
77120	Basin, Operating Room	ea	12	24	36
77130	Basin, Pus	ea	12	25	50
77150	Basin, Sponge	ea	8	25	50
77160	Battery, Dry Cell; 96 for Item 78018, 36 for Item 99340.	ea	132		
77170	Bedpan	ea		75	150
77180	Bell	ea		100	200
77205	Box, Cash	ea		5	6
77240	Box, Ointment, 3 in Nest	doz	10	25	50
77245	Box Opener	ea		3	4
77260	Box, Powder	doz		50	100
77280	Box, Tablet, Folding	500	2	5	10
77310	Bucket, Enamelware	ea	4	15	30
77340–10	Button, Large	gross			6
77340–15	Button, Small	gross		3	6
77345	Button, Staple	gross		2	4
77350	Can, 5 gal	ea		12	24
77360	Can, Approx. 33 gal	ea		12	24
77400	Cane, Walking	ea		15	30
77410	Capsule, Size 00	box		5	10
77420	Capsule, Size 0	box		10	20
77430	Capsule, Size 1	box		10	20
77440	Capsule, Size 2	box		10	20
77450	Capsule, Size 3	box		10	20
77460	Capsule, Size 4	box		5	10
77500	Chest, Tool, Large	ea	2	1	1
77510	Chest, Tool, Small	ea			1
77550–05	Clothesline, Rope	ft	100	200	400
77560	Commode	ea	25	30	60
77563	Condenser, Universal (for use with 78333).	ea			4
77720	Cork Borer	set		1	1
77760	Corkscrew	ea		9	13

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 7—Continued				
77780	Cup, Paper	carton	35	200	400
77790	Cup, Spit, Paper	pkg	15	300	600
77830	Cushion, Rubber, Open Center	ea		10	20
77850–20	Cylinder, Nitrous Oxide, 2,000 gal., Filled.	ea	6	6	12
77855	Cylinder, Oxygen, 80 gal., Filled	ea			2
77870	Cylinder, Oxygen, 1,500 gal., Filled	ea	10	15	30
77890	Cylinder, Valve Adapter, High Pressure.	ea	6	6	12
77910–15	Disinfector, Portable, 1942 Model	ea	1	1	1
77930	Dispensing Set	set		1	1
77950	Dropper, Medicine	doz	3	25	50
77990	File, 5-inch	ea		3	6
78010	Flashlight	ea	24	30	60
78050	Funnel, 6-inch	ea	4	6	9
78070	Glass, Medicine	ea	75	500	1,000
78090	Graduate, 10 cc	ea	2		
78120	Graduate, 250 cc	ea	2	10	15
78150	Graduate, 1,000 cc	ea		8	10
78160	Grinder, Tool	ea		1	1
78180	Hatchet	ea	2		
78190	Hone, Oil, 8 by 12 inches, Arkansas stone.	ea			3
78192	Hone, Oil, 8 by 2 inches, Carborundum	ea		2	
78200–05	Hot Plate, Electric, 1-Burner, 110 V, 60 cycle, AC.	ea		10	16
78220	Irrigator	ea	12	24	46
78235	Jacket, Camisole	ea	6	3	6
78236	Jacket, Camisole, Small	ea	3	2	3
78270	Jar for Dressings	ea	20	25	50
78320	Lamp, Alcohol	ea	20	15	22
78330	Lamp, Alcohol, Wick	ea	20	30	40
78333	Lamp, Examining and Operating, Portable.	ea			4
78517	Machine, Sewing, Foot Treadle Type	ea		1	2
78555	Matches, Safety	carton	36	100	200
78580	Mortar and Pestle, 10 CM	ea		2	3
78590	Mortar and Pestle, 20 CM	ea		2	4
78620	Needle, Common	pkg	3	8	12
78650	Padlock, Large	ea	4	18	24
78660	Padlock, Small	ea	4	18	24
78680	Paper, Toilet	roll	350	4,000	8,000
78690	Paper, Toilet, Fixture	ea		24	48
78710	Percolator	ea		1	6
78750	Pill Tile, 10-inch	ea		2	2
78760	Pin, Common	paper	12	50	100
78770	Pin, Safety, Large	card	250	100	200
78780	Pin, Safety, Medium	card	50	100	200

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 7—Continued				
78790	Pin, Safety, Small	card	50	25	50
78800	Pitcher, Approx. 5-Qt	ea	16	20	40
78830	Pliers, Side Cutting	ea	2		
78840	Restraint Apparatus	ea	2	2	4
78905	Scale, Portable	ea		2	3
78910	Scale, Prescription	ea		1	1
78920	Scale, Prescription, Weights	set		1	1
78970	Shears, Common	ea		6	12
79000	Sheeting, Rubber	yd	100	100	200
79020	Spatula, 3-inch Blade	ea	1	2	
79040	Spatula, 8-inch Blade	ea	1	2	3
79100–05	Sterilizer, Hospital, Steam, 9A, Complete.	ea		1	2
79110	Sterilizer Controls	box		6	12
79230	Strap and Buckle, 3-ft	ea		8	12
79240	Strap and Buckle, 6-ft	ea		8	12
79250	Suppository Mold	ea		1	1
79290	Tape Measure, 60 inches	ea	3	5	10
79320	Thermometer, Clinical	ea	200	400	864
79340–10	Thread, Cotton, Black	spool	6	30	60
79340–40	Thread, Cotton, White	spool	6	30	60
79380	Trap, Mouse	ea		12	24
79390	Trap, Rat	ea		6	8
79400	Tray, Instrument, Approx. 15-inch	ea	25	20	40
79410	Truck, Warehouse	ea		1	2
79430	Tub, Foot	ea	4	4	8
79440	Urinal, Enamelware	ea		100	180
79457	Vial, ½ oz	doz		15	30
79470	Vial, 2 oz	doz	3	50	100
79500	Vial, 16 oz	doz	3	10	20
79550	Wrench, Pipe	ea		1	2
	Class 9				
91030	Bismuth Subcarbonate, USP, 5 Gr. Tab.	bottle	4		
91110	Iodine, 15 Gr, and Potassium Iodide, 22.5 Gr, USP.	box	12		
91155	Morphine Tartrate, ½ Gr. Solution	box	100		
91190	Protein Silver, Mild, USP, 4⅘ Gr. Tab.	bottle	2		
91200	Protein Silver, Strong, USP, 4⅘ Gr. Tab.	bottle	2		
92010	Bandage, Gauze, Compressed, 3-inch	box	50		
92030	Bandage, Plaster of Paris, 6-inch	doz	150		
92040	Bandage, Triangular, Compressed	ea	500		
92050	Dressing, First Aid, Large	pkg	500		
92060	Dressing, First Aid, Small	pkg	500		
92115	Pack, Abdominal, 8 by 36 inches, 30	bag	36		
92117	Pack, Abdominal, 11 by 12 inches, 80	bag	36		
92119	Pad, Surgical, 8 by 10 inches, 50	bag	36		

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 9—Continued				
92121	Pad, Surgical, 12 by 16 inches, 20	bag	18		
92123	Sponge, Surgical, 2 by 2 inches, 200	bag	75		
92125	Sponge, Surgical, 4 by 4 inches, 500	bag	100		
92127	Sponge, Surgical, 4 by 8 inches, 180	bag	300		
93090	Case, Post-Mortem, Complete	ea	1	1	1
93100	Case, Ward, Complete	ea	12	12	
93210	Basic Instrument Set, Complete (1942 Model).	set	10		
93250	Supplemental Instrument Set, Chest Injuries, Complete (1942 Model).	set	2		
93270	Supplemental Instrument Set, Ear, Nose and Throat Injuries, Complete (1942 Model).	set	2		
93290	Supplemental Instrument Set, Eye Injuries, Complete (1942 Model).	set	2		
93310	Supplemental Instrument Set, Fractures and Amputations, Orthopedic, Complete (1942 Model).	set	3		
93320	Supplemental Instrument Set, Genitourinary Injuries, Complete.	set	2		
93330	Supplemental Instrument Set, Maxillofacial Injuries, Complete (1942 Model).	set	1		
93335	Supplemental Instrument Set, Neurosurgical, Brain, and Nerve Injuries, Complete (1942 Model).	set	2		
93500	Anesthesia Apparatus, Portable	ea	2	2	3
93510	Anesthesia Set, Complete	set	6	2	4
93636	Kit, Eye Surgery	ea	1		1
93640	Oxygen Therapy Apparatus, Closed Circuit.	ea	2	2	3
93643	Oxygen Therapy Outfit, with Manifold.	ea	4	4	8
93652	Reactor, Eye, Arruga	ea			2
93690	Scissors, Double Blunt, First Aid, 4-inch.	ea	2		
93707	Shock Team Set, Complete	set	2		
93750	Splint, Wire Gauze	roll	6		
93770	Suture, Silk, Braided, Non-Capillary, 3 sizes.	pkg		100	
93780	Tourniquet, Field	ea	24		
93795	Tourniquet, Kirk	set	2		
94060	Burner, Alcohol, Bunsen Type	ea		3	6
94095	Chest, Laboratory, Field	ea	24		
95021	Chair, Dental, Field	ea		3	6
95025	Chest, MD, No. 60	ea	2		
95065	Kit, Dental, Maxillofacial	ea	1		1
95095	Teeth, Combination Set	set		1	1
96025	X-ray Field Unit, Chest, Film, X-ray.	ea	1	2	2

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 9—Continued				
96055	X-ray Field Unit, Dryer and Loading Bin Combination.	ea		1	1
96060	X-ray Field Unit, Generator, Gasoline, Electrical.	ea	2	1	1
96085	X-ray Field Unit, Machine, X-ray, Mobile, Complete.	ea	2	2	5
96087	X-ray Field Unit, Tube Unit, Chest, MD X–3.	ea	1	1	1
96090	Chest, MD X–1	ea	1	1	2
96115	X-ray Field Unit, Processing Unit, for Darkroom.	ea	1	1	1
96117	X-ray Field Unit, Processing Unit, Auxiliary Wash Tank.	ea	1	1	1
96145	X-ray Field Unit, Table Unit	ea	1	2	3
96175	X-ray Field Unit, Tent, Darkroom	ea	1		
96191	X-ray Field Unit, Biplane Marker and Reorientating Device.	ea	2		2
96208	X-ray Field Unit, Tube Adapter	ea		1	1
97450	Bedpans, Box of	ea	6		
97455	Blanket set, Large	ea	60		
97460	Blanket set, Large, Case Empty	ea	10		
97535	Chest, Field, Plain	ea		3	
97565	Chest, MD, No. 1	ea	2		
97570	Chest, MD, No. 2	ea	2		
97575	Chest, MD, No. 4	ea	2		
97625	Chest, Mess	ea	4		
97645	Chest, Tableware	ea	4		
97757	Gas Casualty Set, Complete	set	2	1	1
97759	Gas Casualty Chest	ea	2		
97775	Lantern Set	ea	8	12	24
97812	Pillow Case, Set	ea	2		
97814	Sheet, Set	ea	15		
97847	Towel Set, Bath	ea	20		
98748	Towel Set, Hand	ea	14		
99010	Acetylene Unit Cylinder, Filled	ea		2	
99010–10	Acetylene Unit, Cylinder Filled, Type B.	ea			2
99057	Bar, Insect, Field	ea	400	500	1,000
99060	Bar, Mosquito, Frame	pr			1,000
99073	Basket, Dish Sterilizing	ea	6	2	6
99075	Bed, Folding	ea		500	1,000
99080	Bed Frame, Gatch	ea		25	50
99090	Blanket, OD	ea		1,500	3,000
99100	Boiler, Steam	ea		1	2
99110	Book, Note, Manifolding, Binder	ea		6	12
99115	Book, Note, Manifolding, Filler	ea		12	25
99120	Bowl, Sugar, Enamelware	ea		60	110
99150	Cabinet, Instrument, Field	ea		4	6
99155	Cabinet, Medicine, Field	ea		6	12
99160–05	Cap, Operating, Large	ea	50	10	25

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Class 9—Continued				
99160–10	Cap, Operating, Medium	ea	50	40	75
99165	Carriage, Dressing, Knocked down	ea	3	7	14
99175	Carrier, Field, Collapsible	ea	3	6	10
99185	Chair, Common, Folding	ea	25	150	300
99195	Corks, Assorted, 300	bag	2	5	10
99200	Corkscrew, Folding	ea	3		
99205	Cot, Folding, Canvas	ea	400		
99215	Cup, Enamelware	ea	100	500	1,000
99220	Cup, Feeding, Enamelware	ea		25	50
99235	Dish, Meat, Small, Enamelware	ea		90	165
99245	Dish, Vegetable, Enamelware	ea		150	300
99270	Graduate, 60 cc	ea		2	6
99275	Graduate, 550 cc	ea	6	15	30
99285	Hone, Oil, 3½ inch	ea	2		
99305	Irrigation Stand, Folding	ea	6		
99315	Lamp, Operating, Field	ea	8	10	16
99317	Lamp, Operating, Field, Generator, Gasoline.	ea		2	2
99340	Lantern, Electric	ea	15	18	30
99345	Lantern, Electric, Lamp	ea	30		12
99376	Litter, Steel Pole	ea	60	25	50
99386	Litter, Securing Strap	ea	48	20	40
99387	Machine, Imprinting	ea	4		
99388	Machine, Imprinting, Ribbon	ea	2		
99400	Mortar and Pestle, 7 CM	ea	2		
99410	Pad, Heat, Complete	ea	50		
99415	Pad, Heat, Refill	ea	100		
99445	Pill Tile, 5-Inch, Bakelite	ea	1		
99465	Plate, Dinner, Enamelware	ea		600	1,200
99490	Saucer, Enamelware	ea		500	1,000
99500–28	Sterilizer, Dressing and Utensil, for use with Leaded Gasoline.	ea	2	2	2
99523	Sterilizer, Instrument, 20-inch	ea	10	6	10
99535	Sterilizer, Instrument, 12-inch	ea	6	8	12
99540	Sterilizer, Instrument, 9¾-inch	ea		8	12
99550	Stove, 1-Burner, Gasoline	ea	6		
99555	Stove, 2-Burner, Gasoline	ea	14	8	18
99560	Table, Bath	ea	2		
99565	Table, Bedside, Folding	ea		50	100
99570	Table, Dining, Folding	ea		20	40
99575	Table, Instrument, Folding	ea	12	6	12
99580	Table, Operating, Folding	ea	8	3	4
99600–03	Unit, Power, Electric, 3-Kilowatt	ea	3	2	3
99617	Washing Machine, Wringer Type	ea		2	3
99630	Wire, Galvanized Iron, No. 14	ft	50		
	Medical Books, Title				
B000010	Anatomy Text	ea	1	1	1
B000012	Manual of Surgical Anatomy	ea	1	1	1

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Medical Books, Title—Continued				
B000020	Bacteriology Text	ea	1	1	1
B000021	Practical Bacteriology, Hematology, and Animal Parasitology.	ea		1	1
B000030	Cardiology Text	ea		1	1
B000032	Nomenclature and Criteria for Diagnosis of Diseases of the Heart.	ea		1	1
B000033	Electrocardiology Text	ea			1
B000040	Dental Surgery Text	ea			1
B000050	Dispensatory Text	ea			1
B000060	Dermatology Text	ea		1	1
B000061	Manual of Dermatology	ea	1	1	1
B000070	Dictionary, Webster, Medium	ea		1	1
B000080	Ear, Nose, and Throat Text	ea		1	1
B000090	Eye Manual	ea		1	1
B000091	Surgical Ophthalmology	ea			1
B000100	Genitourinary Text	ea		1	1
B000110	Internal Medicine Text	ea	1	1	1
B000120	Neurology Text	ea	1	1	1
B000121	Neuropsychiatry Text	ea	1	1	1
B000122	Neurosurgery Text	ea	1	1	1
B000130	Laboratory Manual	ea	1	1	1
B000131	Manual of Dehydrated Culture—Media.	ea		1	1
B000140	Medical Dictionary, Small	ea		1	1
B000150	Pathology Text	ea		1	1
B000160	Pharmacy Text	ea	1	1	1
B000161	Useful Drugs	ea	1	1	1
B000162	U.S. Pharmacopoeia (12th Edition, 1942).	ea		1	1
B000170	Surgery Text	ea	1	1	1
B000171	Infections of the Hand	ea	1	1	1
B000172	Field Surgery in Total War	ea	1	1	1
B000173	Modern Surgical Technic	ea	1	1	1
B000174	Amputations	ea	1	1	1
B000175	Surgery of Modern Warfare	set	1	1	1
B000180	Manual on Plastic and Maxillofacial Surgery.	ea	1	1	1
B000181	Manual on Ophthalmology and Otolaryngology.	ea	1	1	1
B000182	Manual on Abdominal and Genitourinary Injuries.	ea	1	1	1
B000183	Manual on Orthopedic Subjects	ea	1	1	1
B000184	Manual on Burns, Shocks, Wound Healing, and Vascular Injuries.	ea	1	1	1
B000185	Manual on Thoracic Surgery, Neurosurgery and Peripheral Nerve Injuries.	ea	1	1	1
B000190	Orthopedic Text	ea	1	1	1
B000191	Handbook of Orthopedic Surgery	ea		1	1

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital 1,000-bed)
	Medical Books, Title—Continued				
B000192	The Foot and Ankle	ea		1	1
B000194	Outline of the Treatment of Fractures	ea	1	1	1
B000200	X-Ray Manual	ea	1	1	1
B000240	Military Preventive Medicine	ea	1	1	1
B000250	Treatment Text	ea	1	1	1
B000260	Nutritional Deficiencies	ea		1	1
B000270	Anesthesia Text	ea	1	1	1
B000271	Clinical Anesthesia	ea	1	1	1
B000290	Gonorrhea in the Male and Female	ea	1	1	1
B000300	Tropical Medicine	ea	1	1	1
B000301	Diseases, Tropical and Subtropical	ea	1	1	1
B000310	Medical Manual of Chemical Warfare	ea	1	1	1
B000380	Emotional Hygiene	ea		1	1
B000381	Social Customs	ea		1	1
B000382	Principles of Ethics	ea		1	1
B000383	Introduction to the Principles of Nursing Care.	ea		1	1
B000384	Nurses' Handbook of Obstetrics	ea		1	1
B000385	Surgical Nursing	ea		1	1
B000386	Physiology and Anatomy	ea		1	1
B000387	Lippincott's Quick Reference Book for Nurses.	ea		1	1
B000388	Essentials of Medicine	ea		1	1
B000389	Materia Medica; Pharmacology and Therapeutics.	ea	1	1	1
B000390	Essentials of Nursing	ea		1	1
B000391	Emergency Care	ea		1	1
	Blank Forms				
16 B	Issue Slip, Nonexpendable Medical Property.	ea		1,000	2,000
16 C	Credit Slip, Nonexpendable Medical Property.	ea		500	500
16 D	Exchange Slip, Nonexpendable Medical Property.	ea		250	500
21	Hospital Laundry List	ea		100	100
49	Statement of the Hospital Fund	ea		25	25
51	Report Sheet for Report of Sick and Wounded.	ea	20	25	25
52	Register Card	ea			12,000
52 A	Index Record of Patients (Card)	ea		4,000	8,000
52 B	Emergency Medical Book Tab (20 in duplicate).	ea	200		
52 C	Field Medical Card	ea	5,000	6,000	12,000
52 D	Field Medical Record Jacket	ea	5,000	6,000	12,000
53	Clearing Station Tag	ea	5,000		
54	Surgeon's Request for Service Record	ea		500	1,000
55 A	Clinical Record, Brief	ea		6,000	12,000

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Blank Forms—Continued				
55 B	Clinical Record, Chief Complaint, Condition on Admission, Previous Personal History.	ea		3, 000	6, 000
55 C–1	Clinical Record, Physical Examination.	ea		3, 000	6, 000
55 C–2	Clinical Record, Special Examination or Additional Data	ea		1, 000	2, 000
55 D	Clinical Record, Initial Summary, Working Diagnosis, Contemplated Laboratory Tests and Consultations.	ea		3, 000	6, 000
55 E–1	Clinical Record, Consultation Request and Report.	ea		500	1, 000
55 E–2	Clinical Record, Ophthalmologic Examination.	ea		1, 000	1, 000
55 E–3	Clinical Record, Ear, Nose and Throat Examination.	ea		500	1, 000
55 E–4	Clinical Record, Dental Examination	ea		100	200
55 E–5	Clinical Record, Dental Record	ea		1, 000	2, 000
55 E–6	Clinical Record, Proctoscopic Examination.	ea		100	200
55 E–7	Clinical Record, Urologic Examination.	ea		500	1, 000
55 F	Clinical Record, Progress Notes	ea		6, 000	12, 000
55 G–1	Clinical Record, Treatment	ea		5, 000	10, 000
55 H–1	Clinical Record, Temperature, Treatment Nurse's Notes.	ea		6, 000	12, 000
55 H–2	Clinical Record, Temperature Graphic Chart.	ea		1, 000	2, 000
55 J	Clinical Record, Electrocardiographic Report.	ea			100
55 K–1	Clinical Record, Radiologic Record	ea		1, 000	2, 000
55 K–2	Clinical Record, Radiologic Report	ea		4, 000	8, 000
55 L	Clinical Record, Laboratory Reports	ea		3, 000	6, 000
55 L–1	Clinical Record, Blood	ea		3, 000	6, 000
55 L–2	Clinical Record, Blood (Chemistry)	ea		500	1, 000
55 L–3	Clinical Record, Serology	ea		3, 000	6, 000
55 L–4	Clinical Record, Spinal Fluid	ea		200	400
55 L–5	Clinical Record, Urinalysis	ea		6, 000	12, 000
55 L–6	Clinical Record, Urinalysis (Quantitative).	ea		400	800
55 L–7	Clinical Record, Sputum	ea		400	800
55 L–8	Clinical Record, Gastric Analysis	ea		200	400
55 L–9	Clinical Record, Feces	ea		2, 000	4, 000
55 L–10	Clinical Record, Carbohydrate Tolerance.	ea		200	400
55 L–11	Clinical Record, Rental Functions (Conc. or Dil.).	ea		200	400

Item no.	Item	Unit	Evacuation hospital (400-bed)	Station hospital (500-bed)	General hospital (1,000-bed)
	Blank Forms—Continued				
55 L–12	Clinical Record, Renal Function (P.S.P.).	ea		200	400
55 L–14	Clinical Record, Basal Metabolism	ea			100
55 L–15	Clinical Record, Miscellaneous	ea		2, 000	4, 000
55 M	Clinical Record, Pathological Examination of Tissues.	ea		100	200
55 N	Clinical Record, Physiotherapy Record.	ea		100	200
55 0–1	Clinical Record, Preoperative Examination and Anesthetic Record.	ea		400	800
55 0–2	Clinical Record, Operation Report	ea		400	800
55 P	Clinical Record, Fracture Record	ea		400	800
57	Report of Dental Service	ea		25	25
64	Morning Report, Army Nurse Corps.	ea		100	200
72	Morning Report of Ward	ea	500	500	2, 000
72 A	Consolidated Morning Report of Ward.	ea	100	100	400
73	Diet Slip	ea		500	1, 000
74	Mess Account	ea	20	25	25
75	Patient's Property Card	ea	5, 000	1, 500	3, 000
76	Patient's Property Tag	ea	5, 000	1, 500	3, 000
78	Syphilitic Register	ea	100	250	500
79	Register of Dental Patients (Card)	ea	100	1, 000	2, 000
81	Immunization Register	ea		1, 000	2, 000
85	Vital Statistics Chart	ea	25	30	60
85 A	Vital Statistics Chart (Small)	ea	25	30	60
86 AB	Statistical Report, First and Second Sections.	ea	50	50	50
86 C	Statistical Report, Third Section (Personnel and Transportation).	ea	20	50	50
97	Record of Serological Reactions for Syphilis.	ea		500	1, 000

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